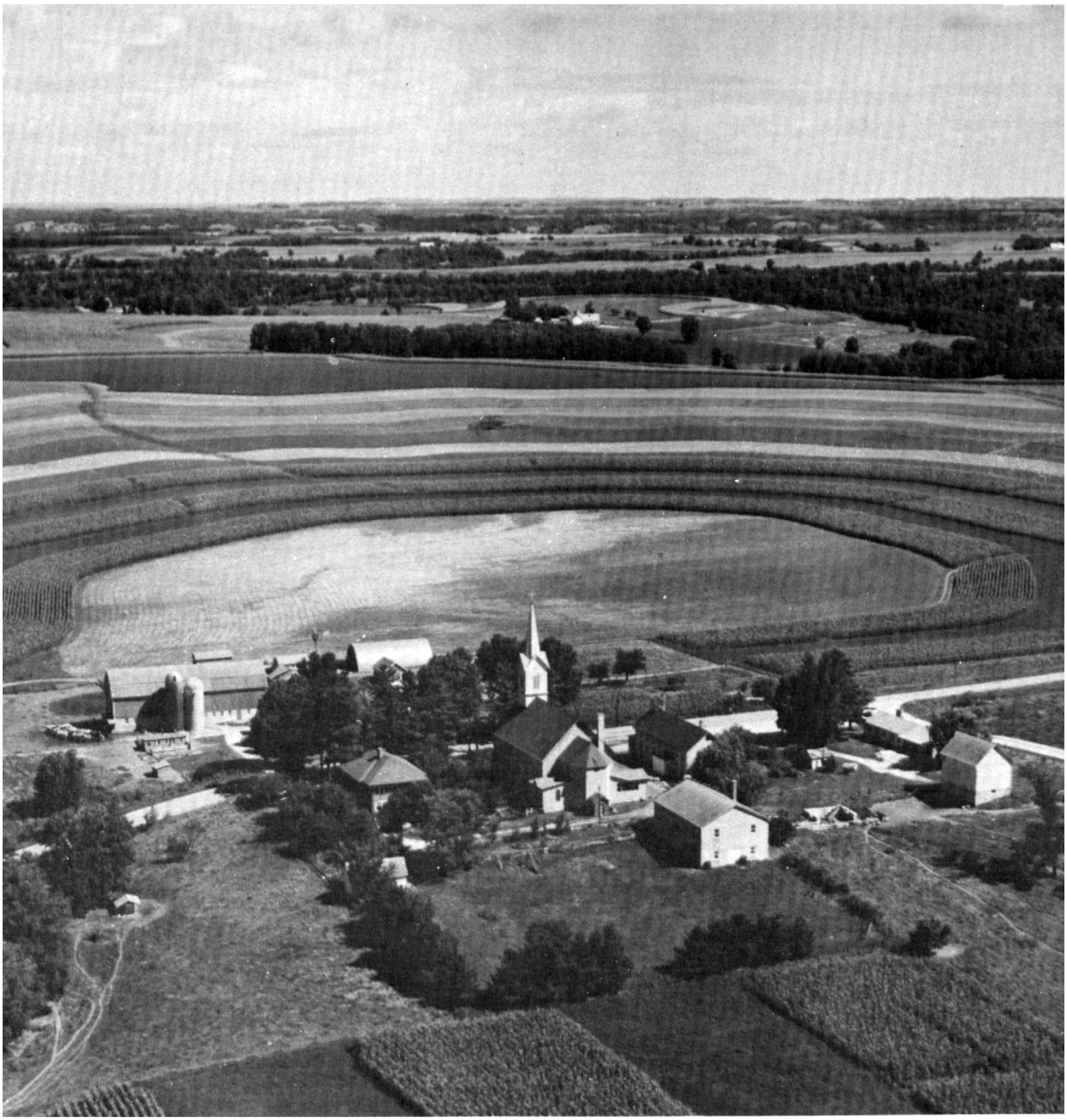
United States
Department of
Agriculture

Soil
Conservation
Service

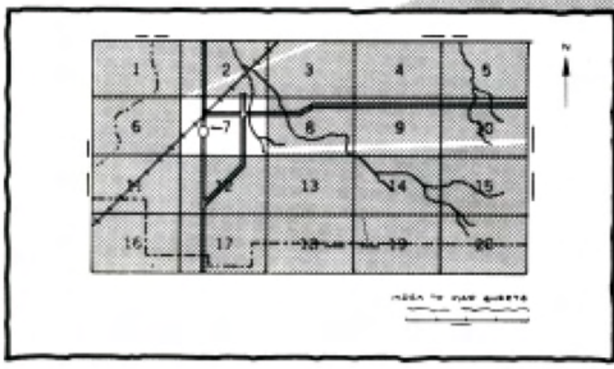
In Cooperation with
Research Division of
the College of
Agricultural and
Life Sciences
University of Wisconsin

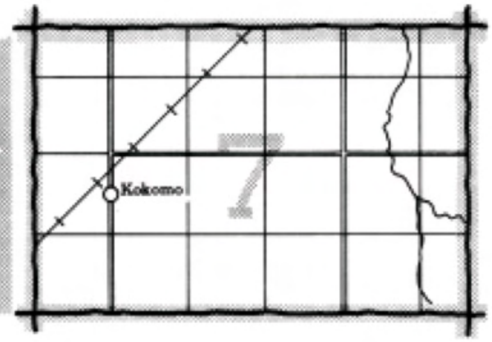
Soil Survey of Monroe County, Wisconsin



HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"





2. Note the number of the map sheet and turn to that sheet.

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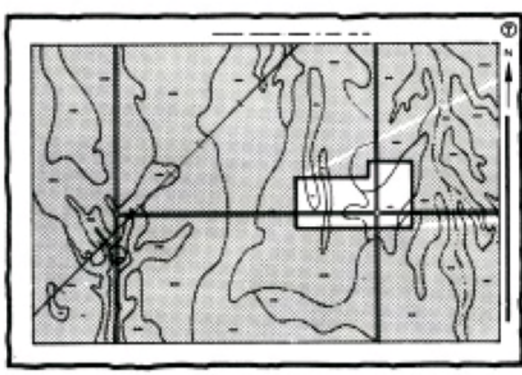
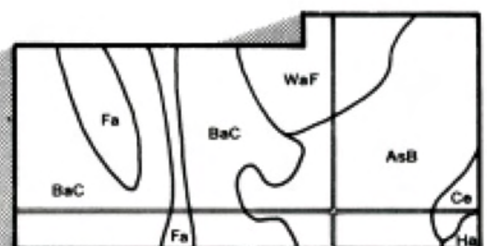
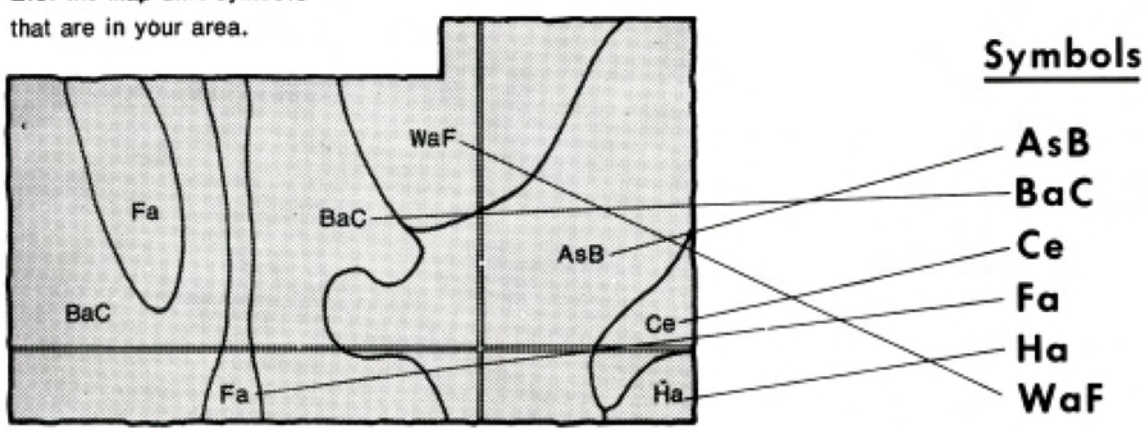


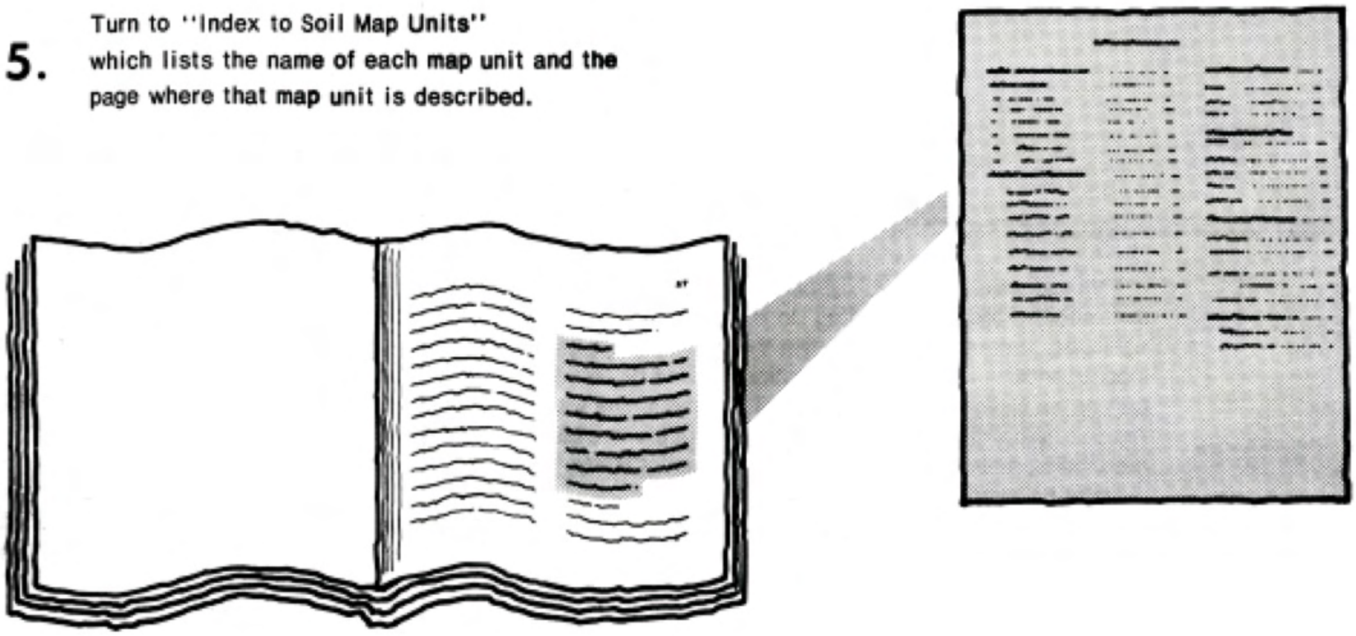


4. List the map unit symbols that are in your area.

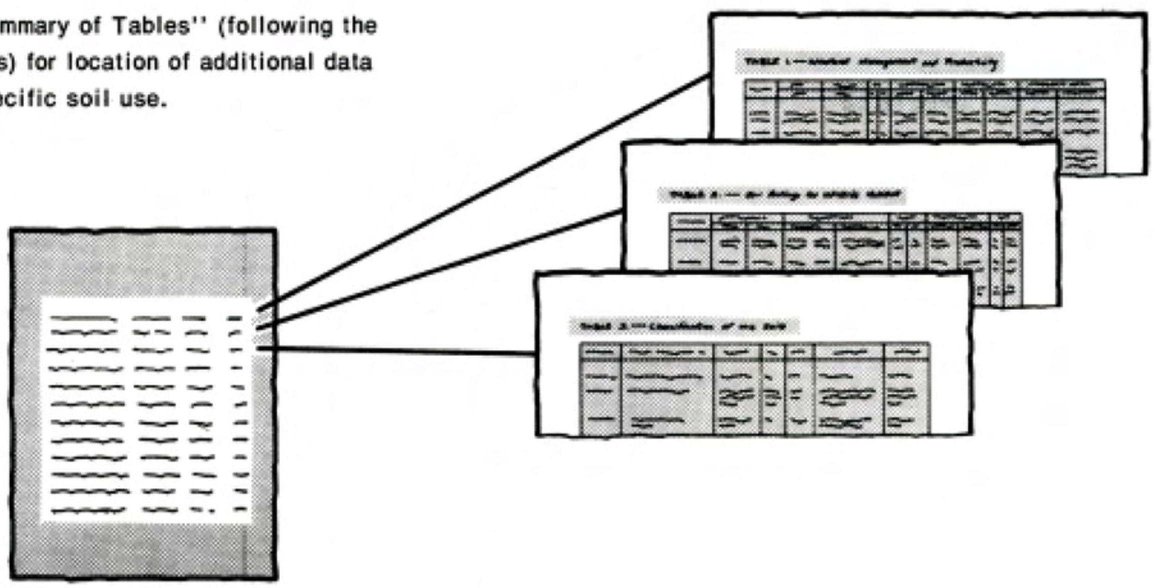


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were approved in 1981. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service and the Research Division of the College of Agricultural and Life Sciences, University of Wisconsin. It is part of the technical assistance furnished to the Monroe County Soil and Water Conservation District. The fieldwork was partly financed by the district.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Contour strips of corn, oats, and alfalfa on soils of the Hillcrest series. Contour stripcropping is an important erosion control practice in Monroe County.

Contents

Soil Series

Issued June 1984

Index to Map Units

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Monroe County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Cliffton A. Maguire

Cliffton A. Maguire
State Conservationist
Soil Conservation Service

Soil Survey of
Monroe County, Wisconsin

By Wayne D. Barndt and John E. Langton, Soil Conservation Service

Fieldwork by Neil R. Babik, Wayne D. Barndt, Martha C. Boman, Craig A. Ditzler, Steven L. Elmer, Randall R. Gilbertson, Howard F. Gundlach, John E. Langton, Theron A. Meyer, Susan M. Tikalsky, and Charles E. Wilkinson, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
in cooperation with the Research Division of the
College of Agricultural and Life Sciences, University of Wisconsin

MONROE COUNTY is in west-central Wisconsin (fig. 1). It is bordered on the west by La Crosse County, on the south by Vernon County, on the east by Juneau County, and on the north by Jackson County. At its widest points, Monroe County is about 33 miles across from east to west and 30 miles across from north to south. The total area is about 585,280 acres, or 914.5 square miles. The population was 35,074 in 1980. Sparta, in the west-central part of the county, is the county seat.

The southern and western two-thirds of the county is in the Driftless Area of Wisconsin. This region consists of a highly dissected plateau characterized by narrow ridges and deep, fairly broad valleys. The remaining one-third of the county, in the northeast and the east-central area, is in the basin of glacial Lake Wisconsin.

Farming is the leading enterprise. Alfalfa, oats, and corn are the major crops and are used mainly for the feeding of dairy cattle and other livestock.

An older soil survey of Monroe County was published in 1923. The present survey updates the earlier one and provides additional information and larger maps that show the soils in greater detail (*8*).

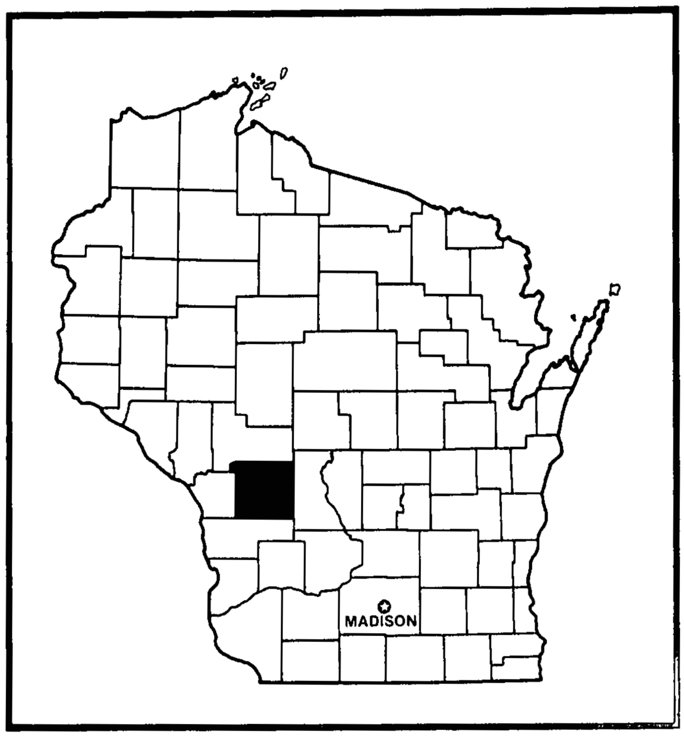


Figure 1.—Location of Monroe County in Wisconsin.

General Nature of the Survey Area

This section gives general information concerning the county. It discusses history and development; climate; physiography, relief, and drainage; water supply; and transportation and industry.

History and Development

The area now known as Monroe County was ceded to the United States Government on November 1, 1837, by the Winnebago Indians (*5*). On October 1, 1842, Esau

Johnson became the first resident on record in the county, settling near Oil City in the town of Sheldon. In 1849, a state road was opened between Hudson and Prairie du Chien. This road, combined with an Indian trail used as a road from Portage to La Crosse, spurred settlement in Monroe County through 1851. Until 1854, Monroe County was part of La Crosse County, which originally encompassed the areas now known as Buffalo, Jackson, La Crosse, Monroe, and Trempealeau Counties.

Monroe County's development was hastened by railroad construction. The Chicago, Milwaukee, St. Paul, and Pacific Railroad was completed in 1858 between La Crosse and Milwaukee. It passes through the central part of the county. In 1873, the Chicago and North Western opened a railroad between Madison, Wisconsin, and Winona, Minnesota. This rail line no longer exists, but it did pass through Kendall, Wilton, Norwalk, and Sparta. The hilly nature of this part of the county necessitated the construction of three tunnels, the longest of which is 3,800 feet. This discontinued rail line is now the Elroy-Sparta Bike Trail. In 1910, the Chicago and North Western Company constructed a branch railroad through the eastern part of the county. This passes through Tunnel City and avoids the steep grades of the Sparta-Kendall branch.

In 1909, the War Department acquired a tract of land a little larger than 14,000 acres and called it "Camp Robinson." Its name was later changed to "Camp McCoy" in honor of Colonel R. B. McCoy. In 1974, it was renamed Fort McCoy, which reflects its designation as a permanent military facility. It now encompasses about 60,000 acres.

The earliest farmers in Monroe County raised crops for their own needs only. In the late 1800's and early 1900's commercial production of berries and other fruits became an important part of agriculture in the county. Though fruit production in general has declined, Monroe County is second in production of cranberries in Wisconsin (*13*). At present, over 50 percent of the farm income in the county comes from dairy farming. The remaining farm income is derived from sales of beef, poultry, cash crops, fruits, vegetables, and forest products.

Most of the soils in Monroe County have a moderate to very severe hazard of erosion, and in 1933, Congress appropriated money to begin an erosion control program. In the same year, an agreement was signed that made Coon Valley, part of which is in Monroe County, the first watershed demonstration project in the Nation.

In 1860, Monroe County had a population of 8,407. This figure increased to 16,550 by 1870, to 28,888 by 1910, and to 31,610 by 1970. In 1980 the population was 35,074.

Climate

The climate of Monroe County is continental. Frequent pressure systems that move across the continent from west to east are the major influence on the area's weather. A variety of weather can be expected in all seasons. Spring is often late in coming and is a mixture of warm and cold periods. As spring advances, precipitation increases, reaching a peak in June. Summers are warm, with several hot and humid spells. These spells last for only a few days. Cool periods generally occur during any summer month. Fall arrives suddenly in mid-September and often lingers on into November. Nearly every year, the first killing freeze in fall is followed by periods in which the days are abnormally warm and have clear skies or are sunny, hot, and hazy. During these periods, the nights are cool. The change from fall to winter is often abrupt. Winters are long, cold, and snowy. In many years, a thaw lasting one to two weeks occurs in February.

The average date of the last 32 degree freeze in spring is May 11, and the first such freeze in fall is September 27. The growing season, defined as the number of days between the last 32-degree freeze in the spring and the first in the fall, average 139 days. There is some variation within the county, depending on whether the location is in a valley or on a hilltop or a slope. Generally, the valleys have later spring freezes and earlier fall freezes than the slopes of the hills. Extreme temperatures, especially winter minimums, vary considerably with the terrain. Temperatures are usually colder in the valleys.

Precipitation is usually adequate for agricultural purposes, although some degree of soil moisture deficiency usually occurs in July and August. Severe drought affecting all crops is rare. Precipitation in summer is in showers of varying length and intensity. Hail falls on an average of 3 days a year.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Sparta in the period 1937 to 1959. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring.

In winter the average temperature is 19.9 degrees F in December, January, and February, and the average daily minimum temperature is 9.9 degrees. The lowest temperature on record, which occurred at Sparta in January 1951, is -48 degrees. In summer the average temperature is 68.4 degrees, and the average daily maximum temperature is 80.3 degrees. The highest recorded temperature, which occurred at Sparta in July 1936, is 109 degrees.

The total mean annual precipitation is 28.04 inches. Of this, 17.87 inches, or 65 percent, usually falls in May through September. The main part of the growing season for most crops falls within this period. In 2 years out of 10, the rainfall in May through September is less

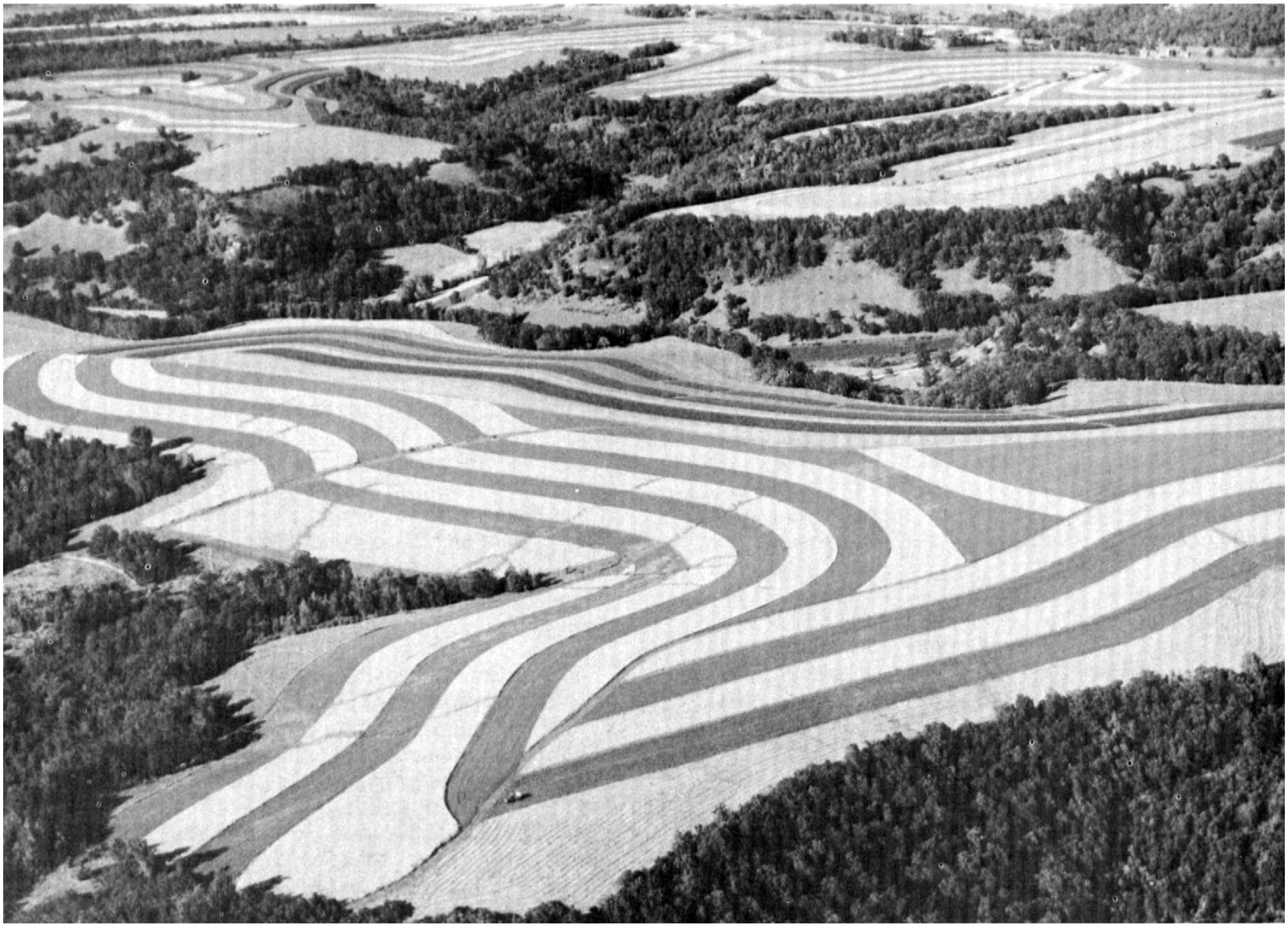


Figure 2.—Aerial view of the unglaciated part of Monroe County, showing the cultivated plateau, or ridgetop, and wooded valley slopes.

than 14.24 inches. The heaviest 1-day rainfall during the period of record was 5.06 inches at Sparta in June 1942. Thunderstorms occur on about 43 days each year, and most occur in June and July.

The average seasonal snowfall is 39.3 inches. The greatest snow depth for any one winter during the period of record was 83 inches in 1959. The least snow during the period of record was 14 inches in 1958.

Relative humidity is above 50 percent about 86 percent of the time and is above 74 percent about 34 percent of the time. The sun shines more than 60 percent of the time from April through September, about 40 percent in November and December, and from 50 to 60 percent in the remaining months. The prevailing wind is from a westerly direction. Average windspeed is highest, 12 miles per hour, in April and the average lowest windspeed is 7 miles per hour in August.

Physiography, Relief, and Drainage

Most of Monroe County is in the unglaciated or Driftless Area of southwestern Wisconsin. It consists mostly of a deeply dissected bedrock plateau that is mantled with loess or residuum of bedrock, or both (fig. 2). In the southwestern and south-central parts of the county, the bedrock under the ridgetops is a relatively thin layer of dolomitic limestone underlain by sandstone. The ridgetops are moderately broad, highly dissected, and are the highest in elevation in the county, ranging from about 1,350 to about 1,450 feet. The valleys, incised from about 300 feet to about 400 feet below the ridgetops, are short, have mostly very steep sides, and are underlain by sandstone. At lower elevations are areas of narrow ridgetops and broad valleys underlain by sandstone. These broad valleys have a thick mantle of residuum and colluvium and alluvium.

The area taking in the northeastern and east-central parts of the county, where the elevation is lowest, generally is part of the basin of Glacial Lake Wisconsin. The basin consists mostly of sandy and clayey deposits that range widely in thickness. Relief in this part of the county is dominantly less than 50 feet, except for occasional sandstone outliers as much as 180 feet high.

All of the major drainageways in Monroe County have their headwaters within the county, with the exception of the Black River in the northwestern corner. The La Crosse and Little La Crosse Rivers drain much of the west-central part of Monroe County. The La Crosse flows southwest. The Little La Crosse flows north until it merges with the La Crosse River a few miles southwest of Sparta. Sand Creek, Clear Creek, and Big Creek drain the northwestern part of the county and flow into the Black River. Sand Creek and Clear Creek leave the county before joining the Black River. Much of the eastern part of the county is drained by the Lemonweir and Little Lemonweir Rivers. They merge beyond the county border. The Baraboo River and Seymour Creek drain the southeastern corner of the county. They also merge beyond the county border. The Kickapoo River drains the south-central part of the county and flows south. Coon Creek drains the southwestern corner of the county.

Water Supply

The many springs, streams, and rivers in Monroe County furnish an abundant supply of surface water. For most uses, however, ground water is the major source. In Monroe County, enough ground water is readily available to meet present and anticipated domestic, agricultural, municipal, and industrial needs.

In any given location the depth to ground water depends on the general topography, the distance above the permanent stream level, and the character of the underlying rock formation. The water is stored in porous strata called aquifers. At a certain depth below the surface, all pores and fissures in the bedrock or in unconsolidated material, such as sand and gravel, are filled with ground water. Wells must be drilled into these water-filled layers in order to obtain an adequate supply of water. The level of ground water may rise and fall from season to season and year to year, depending on rainfall. Generally, the ground water is deeper in the southern part of the county, where wells are commonly 200 to 400 feet deep, and more shallow in the northern half of the county.

Most ground water in Monroe County is obtained from the Cambrian sandstone aquifer, which underlies most of the county. In most places, this aquifer is a reliable source of water suitable for virtually all uses. It produces as much as 1,850 gallons per minute. The average yield in high capacity wells is 500 gallons per minute. In a few places, mostly in the northeastern part of the county, the sandstone aquifer holds less water because it is thin and underlain by igneous crystalline rock.

Another source of ground water is unconsolidated deposits in the valleys of larger rivers and streams and in the glacial lake basin of the northeastern part of the county. Yields of water from these deposits vary with the thickness of the unconsolidated material.

Ground water in Monroe County is generally of good quality and is usable for most purposes. In general, it is soft, having less than 100 milligrams of solids per liter; but it is hard or very hard in some areas of northeast Monroe County. Also, in some places iron content and corrosive properties necessitate special treatment of the water.

Surface water in the county is in streams, small lakes, and wetlands. The major streams passing through the county are the La Crosse, Kickapoo, Baraboo, and Lemonweir Rivers. Most of the wetland areas are in the northeastern part of the county in and near the glacial lake basin. The streams are used mainly for irrigation and for recreation. The wetland areas are used extensively for raising cranberries.

Transportation and Industry

Monroe County has 1,009 miles of local roads, 344 miles of county roads, 177 miles of state highway, and 70 miles of Interstate highways, making up a total of 1,600 miles of roadway. The Interstate system splits into I-90 and I-94 near Tomah; I-90 heads west to La Crosse and I-94 northwest to Eau Claire.

The Chicago, Milwaukee, St. Paul, and Pacific Railroad provides daily freight service to Sparta, Tomah, Fort McCoy, and Tunnel City. The Chicago and North Western Railroad also provides freight service to Sparta, Fort McCoy, Tunnel City, Warrens, and Wyeville. Amtrak provides passenger services, and stops daily at Tomah. A total of 70 miles of railroad is in the county.

The Sparta Municipal Airport and the Tomah Airport serve small aircraft. In addition, there is a federal airfield at Fort McCoy.

Early industry in Monroe County consisted of lumbering, tobacco warehousing, berry culture and marketing, and other agricultural activities. Agriculture, especially dairying, was the center around which most industry in the county evolved. In more recent years, however, the county's economy has been shifting from agriculture to manufacturing.

Today, less than 20 percent of the county's labor force works in agriculture. Agricultural employment dropped 56 percent between 1940 and 1970. Between 1954 and 1967, employment in retail sales rose 16 percent. Since 1947, the number of jobs in manufacturing has more than quadrupled.

The county's present industrial development is varied. Major industries include poultry processing, dairy products, packaging products, metal plating, gray iron

machining, lithographic printing, and metal stamping. Also, the federal installations of Fort McCoy and the Tomah Veteran's Administration Hospital are major employers of full-time and seasonal workers.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and

some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

1. Valton-Downs-Wildale

Nearly level to very steep, well drained and moderately well drained silty soils; on uplands and high stream terraces

Areas of these soils are on ridgetops, valley slopes, and high stream terraces (fig. 3).

This map unit makes up about 17 percent of the county. It is about 45 percent Valton soils, 25 percent Downs soils, 20 percent Wildale soils, and 10 percent soils of minor extent.

Valton soils are on ridgetops and valley slopes. They are well drained. Permeability is moderate in the upper part of the subsoil and slow in the clayey lower part of the subsoil. The available water capacity is moderate. Typically, the surface layer is very dark grayish brown and dark yellowish brown silt loam about 9 inches thick. The subsoil extends to a depth greater than 60 inches. It is dark yellowish brown silt loam in the upper part, brown silty clay loam in the middle, and yellowish red and strong brown silty clay and clay in the lower part.

Downs soils are on ridgetops, valley slopes, and high stream terraces. They are moderately well drained. Permeability is moderate. The available water capacity is high. Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 31 inches thick. It is dark yellowish brown silt loam in the upper part and yellowish brown, mottled silt loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam.

Wildale soils are on ridgetops and valley slopes. They are well drained. Permeability is moderate in the upper part of the subsoil and slow in the clayey lower part of the subsoil. The available water capacity is moderate. Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil to a depth of about 60 inches is dark yellowish brown silty clay loam in the upper part and yellowish red clay in the lower part.

Of minor extent in this map unit are the somewhat poorly drained Atterberry and Reedsburg soils on ridgetops, the excessively drained Brodale and well drained Dorerton soils on the upper parts of valley slopes, and the well drained Norden and somewhat excessively drained Urne soils on ridgetops and valley slopes. Also of minor extent are the somewhat poorly drained Coffeen and Ceresco soils on flood plains, the moderately well drained Kickapoo soils on flood plains, and the well drained Council soils on valley slopes.

Most areas of the less sloping soils are used for cultivated crops, but a considerable acreage of this map unit is in woodland. Erosion is the main problem in cultivated areas.

Most soils on ridgetops are gently sloping and sloping. Where adequately protected from erosion, these soils are suited to the commonly grown cultivated crops. Small patches of tobacco are also grown. Most soils on valley slopes are moderately steep and steep. They are suited to trees. In some cleared areas on valley slopes the soils are suited to pasture and hay crops. Overgrazing and grazing when the soils are too wet are major concerns of pasture management because they cause soil compaction, which increases runoff and erosion.

The major soils in this map unit are poorly suited or moderately suited to septic tank absorption fields. The main limitations to this use are slow permeability or wetness. The major soils in this map unit are poorly suited or moderately suited to dwellings primarily because of the moderate or high shrink-swell potential or because of wetness. Slope greater than 6 percent is an additional limitation for septic tank absorption fields and dwellings.

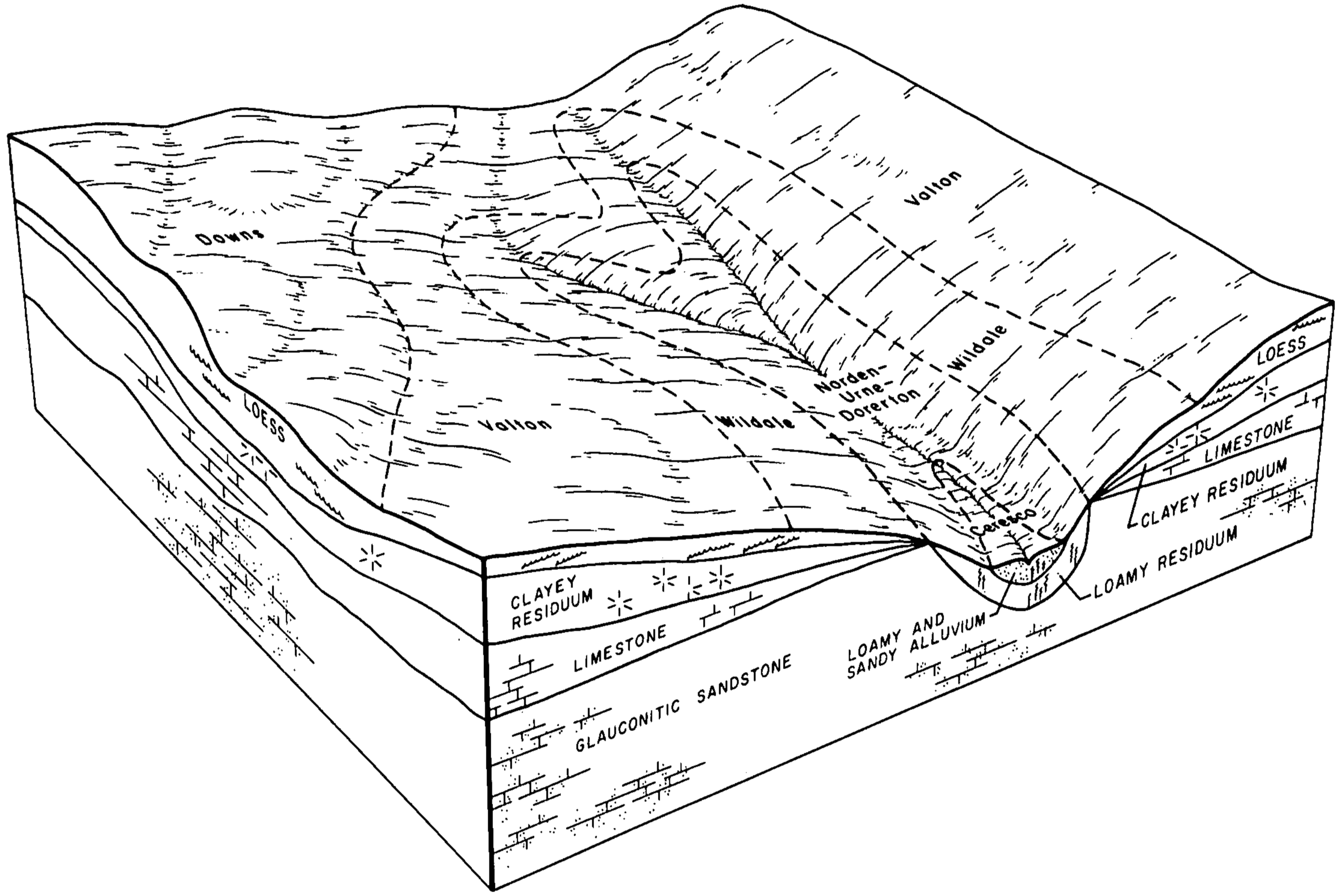


Figure 3.—Relationship of soils and parent material in the Valton-Downs-Wildale map unit.

2. Norden-Urne-La Farge

Gently sloping to very steep, well drained and somewhat excessively drained silty and loamy soils; on uplands

Areas of these soils are on ridgetops and valley slopes (fig. 4).

This map unit makes up about 34 percent of the county. It is about 25 percent Norden soils, 20 percent Urne soils, 10 percent La Farge soils, and 45 percent soils of minor extent.

Norden soils are on ridgetops and valley slopes. They are well drained. Permeability is moderate. The available water capacity is moderate. Typically, the surface layer is very dark grayish brown loam about 3 inches thick. The subsurface layer is brown loam about 7 inches thick. The subsoil is about 19 inches thick. It is dark yellowish brown loam in the upper part, yellowish brown sandy clay loam in the middle, and dark yellowish brown loam in the lower part. Weakly consolidated glauconitic sandstone is at a depth of about 29 inches.

Urne soils are on ridgetops and valley slopes. They are somewhat excessively drained. Permeability is moderately rapid. The available water capacity is low. Typically, the surface layer is very dark brown fine sandy loam about 2 inches thick. The subsoil is about 30 inches thick. It is light olive brown fine sandy loam in the upper part and olive brown fine sandy loam in the lower part. The substratum, about 6 inches thick, is grayish green fine sandy loam. Weakly consolidated fine-grained glauconitic sandstone is at a depth of about 38 inches.

La Farge soils are on ridgetops and valley slopes. They are well drained. Permeability is moderate. The available water capacity is moderate. Typically, the surface layer is a mixture of dark grayish brown and yellowish brown silt loam about 8 inches thick. The subsoil is about 23 inches thick. It is yellowish brown silt loam in the upper part and olive brown fine sandy loam in the lower part. Weakly consolidated fine-grained sandstone is at a depth of about 31 inches.

Of minor extent in this map unit are the somewhat poorly drained Ceresco and moderately well drained Kickapoo soils on flood plains, the well drained Council soils on valley slopes, the well drained Dorerton soils on valley slopes, the somewhat excessively drained Eleva soils on ridgetops and valley slopes, and the moderately

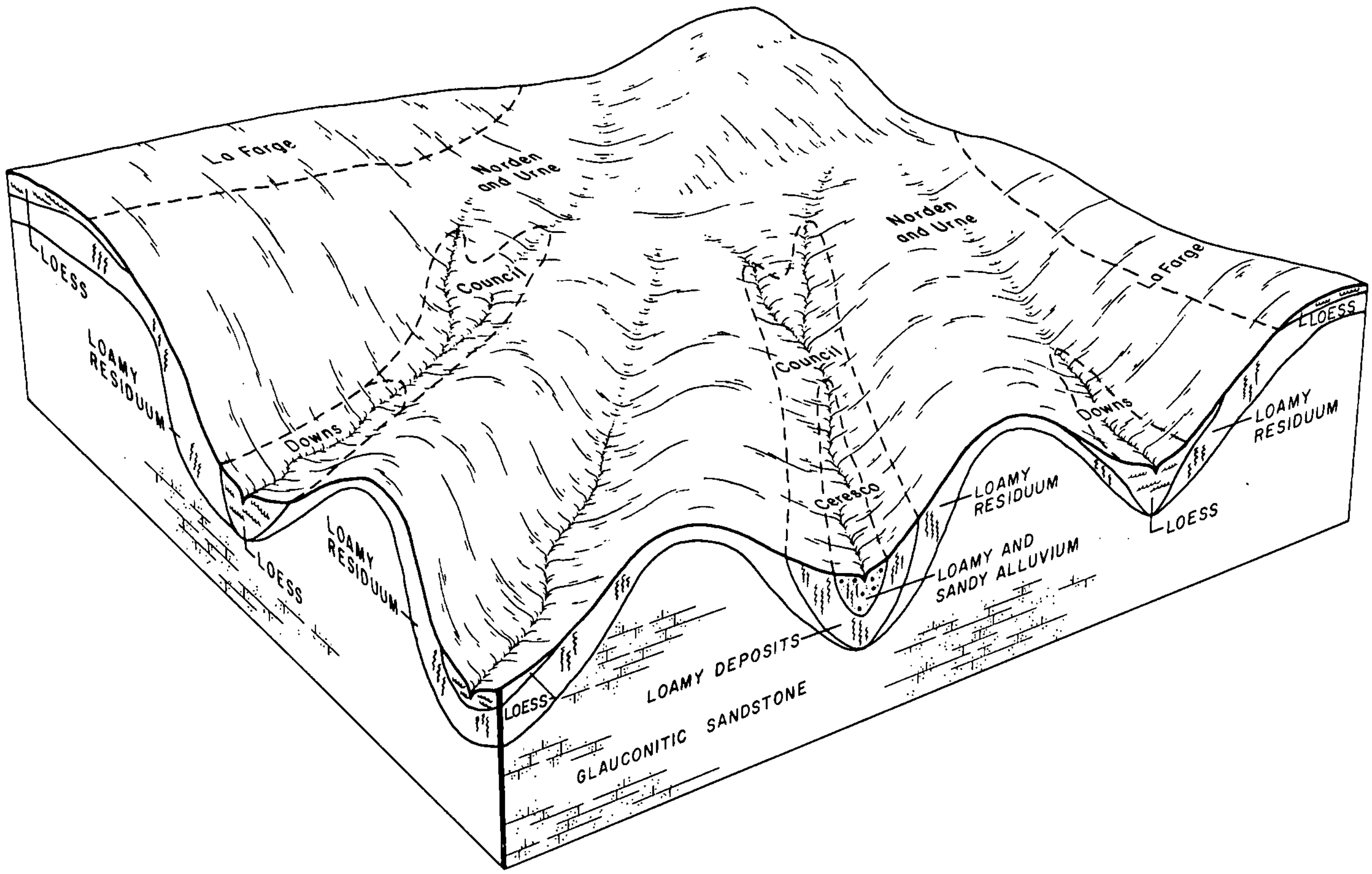


Figure 4.—Relationship of soils and parent material in the Norden-Urne-La Farge map unit.

well drained Downs soils on ridgetops, stream terraces, and valley slopes.

Most areas are in woodland. Only a small acreage is used for cultivated crops.

Most soils in this map unit are suited to trees. Limitations to forest management and harvest are steep slopes and plant competition following harvest. Erosion is a severe hazard along logging roads and skid trails. All of the soils in this map unit are suited to pasture crops. Overgrazing or grazing when the soils are too wet is a major concern of pasture management because it causes soil compaction, thus increasing runoff and erosion. The gently sloping to moderately steep soils are suited to cultivated crops if protected from erosion.

The major soils in this map unit are poorly suited to septic tank absorption fields primarily because of the moderate depth to sandstone. They are only moderately suited to dwellings because of the moderate depth to sandstone and the moderate shrink-swell potential.

3. Tarr-Boone-Impact

Nearly level to very steep, excessively drained and moderately well drained sandy soils; on stream terraces and uplands

Areas of these soils are on ridgetops, valley slopes, and stream terraces (fig. 5).

This map unit makes up about 24 percent of the county. It is about 55 percent Tarr soils, 20 percent Boone soils, 10 percent Impact soils, and 15 percent soils of minor extent.

Tarr soils are on broad valley slopes and stream terraces. They are excessively drained and moderately well drained. Permeability is rapid. The available water capacity is low. Typically, the surface layer is very dark brown sand about 4 inches thick and is covered by about 2 inches of leaf litter. The subsoil is dark yellowish brown sand about 28 inches thick. The substratum to a depth of about 60 inches is yellowish brown sand.

Boone soils are on narrow ridgetops and valley slopes. They are excessively drained. Permeability is rapid. The available water capacity is very low. Typically, the surface layer is very dark grayish brown sand about 2 inches thick and is covered by about 1 inch of leaf litter. The substratum, about 20 inches thick, is strong brown

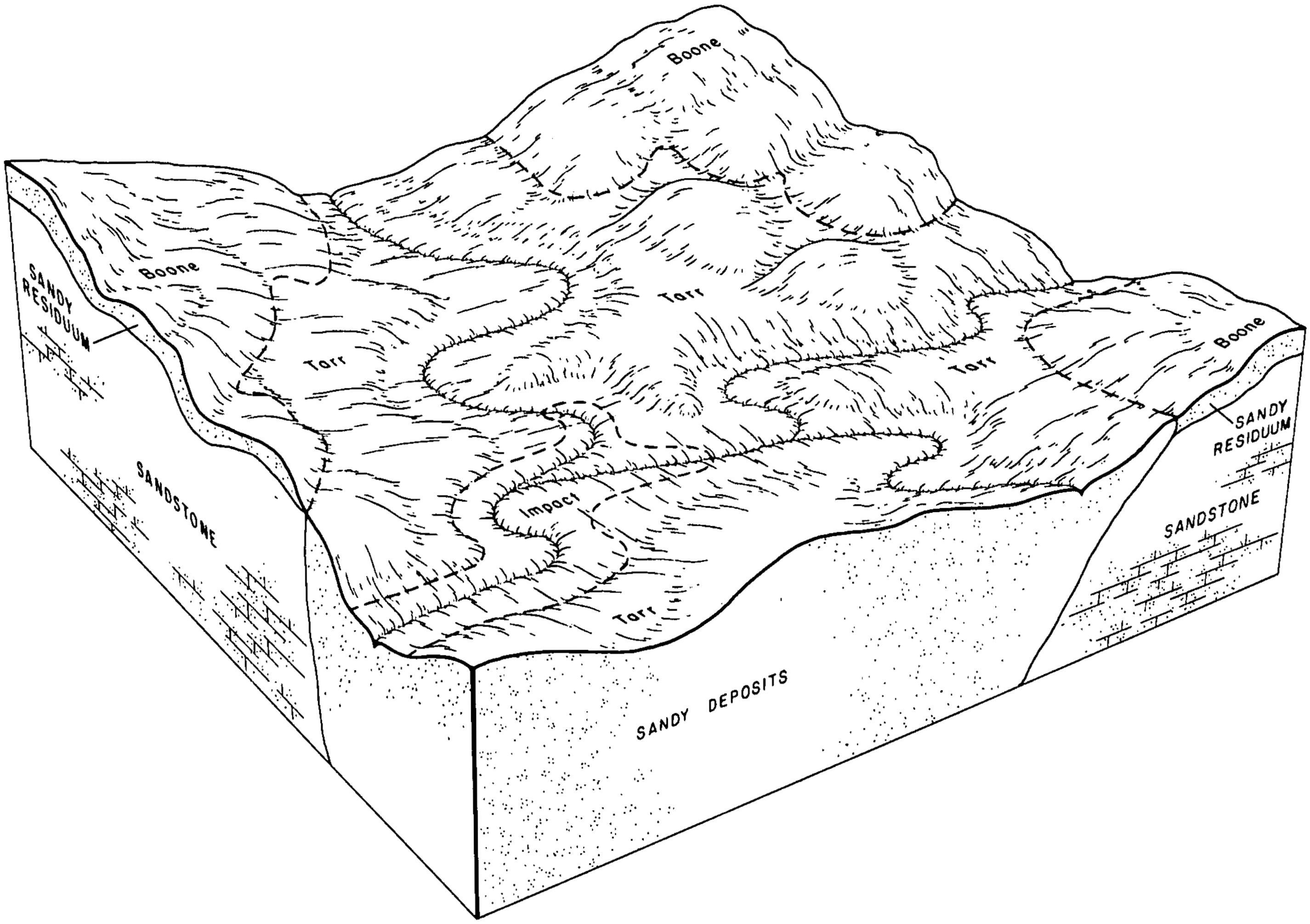


Figure 5.—Relationship of soils and parent material in the Tarr-Boone-Impact map unit.

and yellowish brown sand. Weakly consolidated sandstone is at a depth of about 22 inches.

Impact soils are on broad, low valley slopes and on stream terraces. They are excessively drained and moderately well drained. Permeability is rapid. The available water capacity is low. Typically, the surface layer is black sand about 8 inches thick. The subsurface layer is very dark grayish brown and dark brown sand about 7 inches thick. The subsoil is dark yellowish brown sand about 21 inches thick. The substratum to a depth of about 60 inches is very pale brown sand.

Of minor extent in this map unit are the well drained Billett and Meridian soils on stream terraces and valley slopes and the somewhat excessively drained Eleva soils on ridgetops and valley slopes. Also of minor extent are the somewhat poorly drained Hoopeston soils on stream terraces and the somewhat poorly drained Au Gres and Meehan soils and the poorly drained Newson soils on stream terraces and lake basins.

Most areas of these soils are in woodland. A few areas are used to grow cultivated crops.

The soils on stream terraces, low valley slopes, and lake basins are deep and are suited to trees. The moderately deep soils on ridgetops and valley slopes are poorly suited to trees. In some areas, slopes restrict the use of logging equipment. Erosion is a hazard along logging roads and skid trails.

The nearly level and gently sloping soils of this map unit are suited to cultivated crops. Crop production is low because these soils have low or very low available water capacity. If irrigated, these soils are well suited to crops such as potatoes, strawberries, and soybeans. Soil blowing is a severe hazard where these soils are cultivated. These soils are poorly suited to pasture crops because of the low or very low available water capacity.

The major soils in this map unit are poorly suited to septic tank absorption fields. The main limitations to this use are the presence of sandy horizons that do not adequately filter the effluent and the moderate depth to

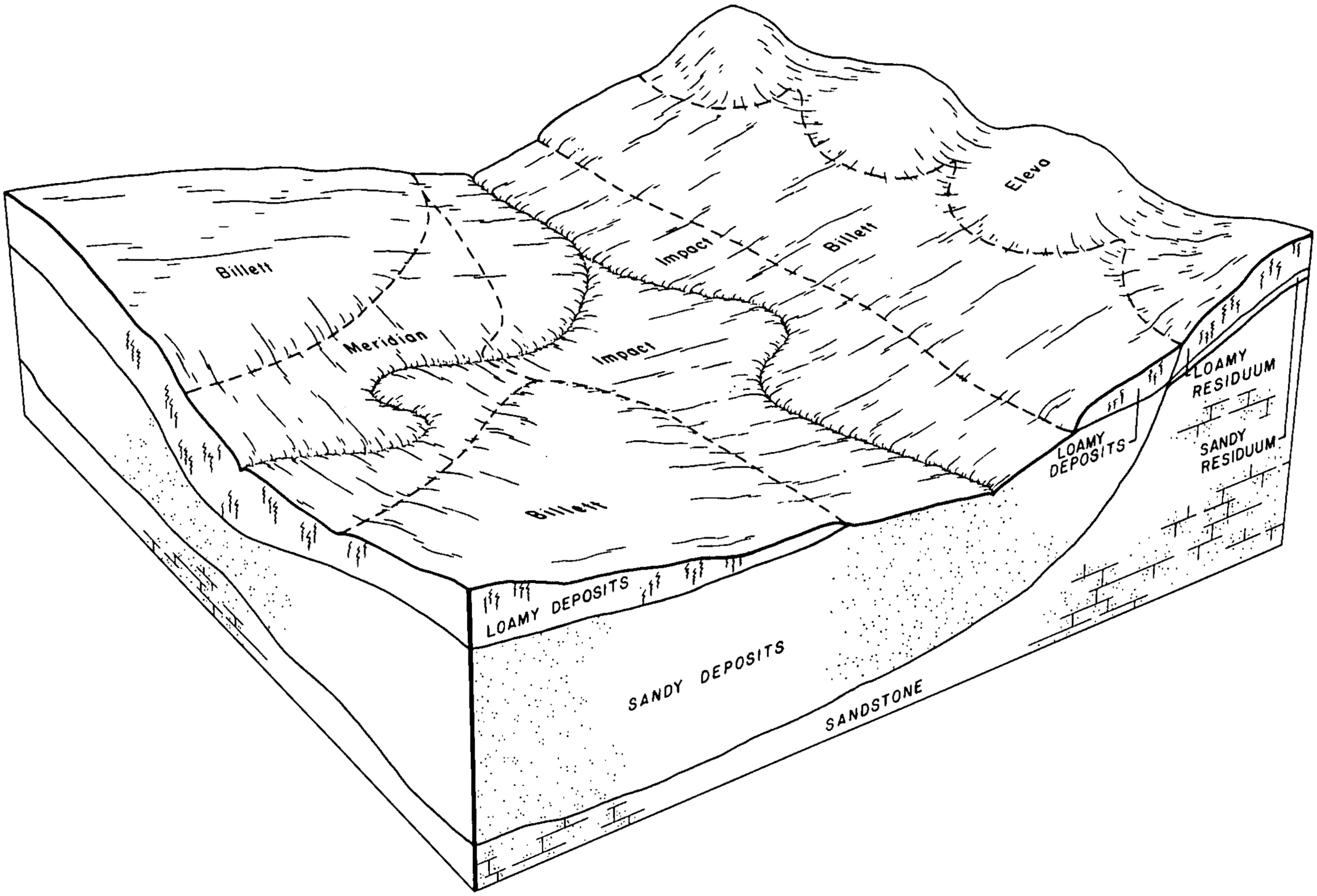


Figure 6.—Relationship of soils and parent material in the Billett-Impact map unit.

sandstone. The Boone soils that have slopes of less than 12 percent are only moderately suited to use as sites for dwellings because of slope and the moderate depth to sandstone. The Impact and Tarr soils that have slopes of less than 6 percent are suited to dwellings. Slope is a limitation for septic tank absorption fields and dwellings in areas of Boone soils where slope is greater than 12 percent and in areas of Impact and Tarr soils where slope is greater than 6 percent.

4. Billett-Impact

Nearly level to moderately steep, excessively drained to moderately well drained loamy and sandy soils; on stream terraces and uplands

Areas of these soils are on valley slopes and on stream terraces (fig. 6).

This map unit makes up about 7 percent of the county. It is about 38 percent Billett soils, 24 percent Impact soils, and 38 percent soils of minor extent.

Billett soils are on valley slopes and stream terraces. They are well drained and moderately well drained. Permeability is moderately rapid in the subsoil and rapid in the substratum. The available water capacity is moderate. Typically, the surface layer is very dark grayish brown sandy loam about 9 inches thick. The subsoil is dark yellowish sand.

Impact soils are on broad, low valley slopes and on stream terraces. They are excessively drained and moderately well drained. Permeability is rapid. The available water capacity is low. Typically, the surface layer is black sand about 8 inches thick. The subsurface layer is very dark grayish brown and dark brown sand about 7 inches thick. The subsoil is dark yellowish brown sand about 21 inches thick. The substratum to a depth of about 60 inches is very pale brown sand.

Of minor extent in this map unit are the excessively drained Tarr soils on broad valley slopes and stream terraces, the somewhat excessively drained Eleva soils on ridgetops and valley slopes, and the well drained and moderately well drained Downs, Jackson, and Meridian soils on valley slopes and stream terraces. Also of minor extent are the somewhat poorly drained Curran, Dells, and Hoopeston soils on stream terraces, the somewhat poorly drained Meehan soils on stream terraces and lake

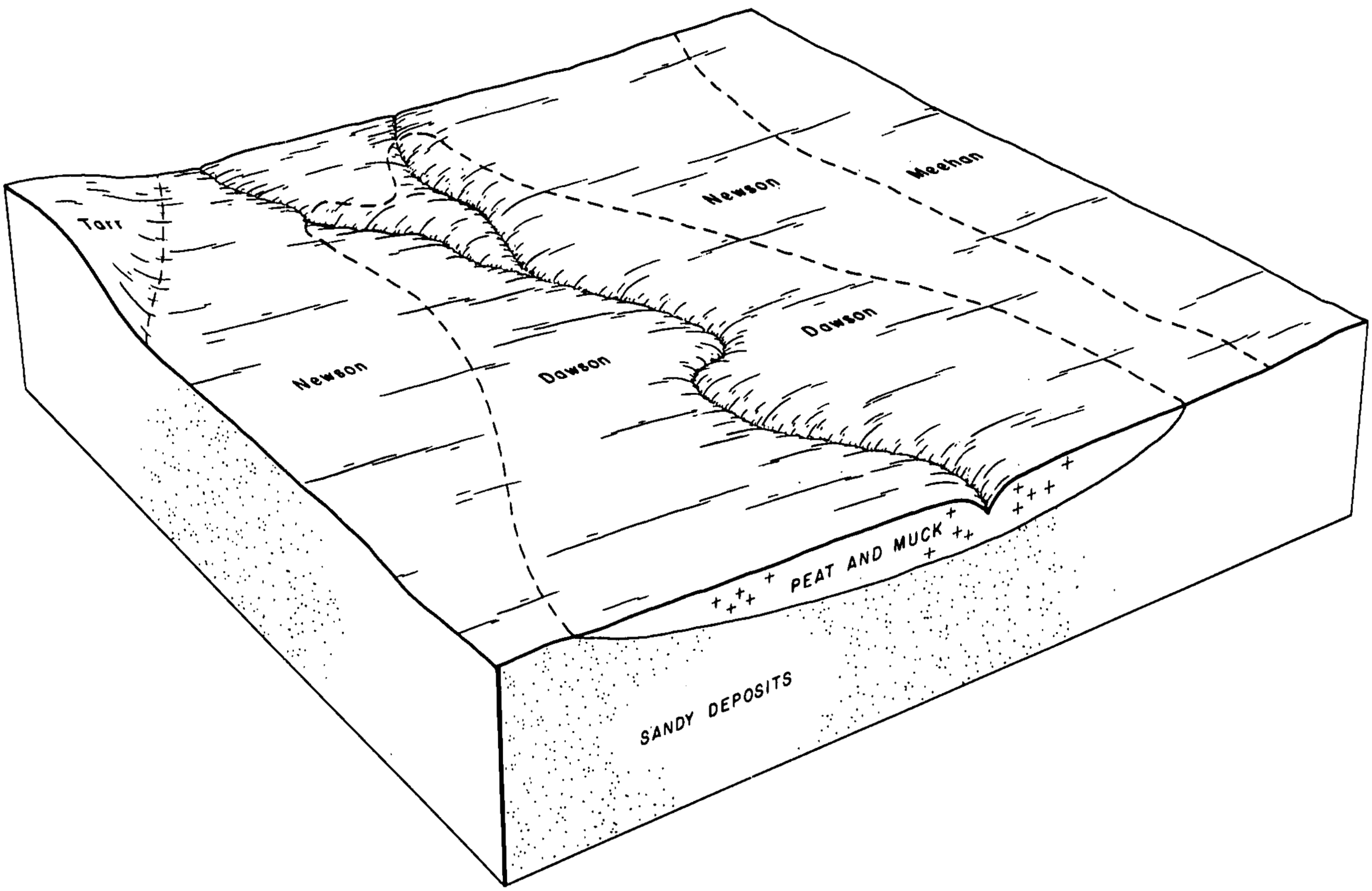


Figure 7.—Relationship of soils and parent material in the Newson-Dawson-Meehan map unit.

basins, the somewhat poorly drained Shiffer soils on stream terraces and valley slopes, the poorly drained Kato soils on valley bottoms and flood plains, and the poorly drained Newson soils on stream terraces and lake basins.

Most areas of these soils are used for cultivated crops. The main problems are low or moderate available water capacity and soil blowing.

The nearly level to sloping soils in this map unit are suited to cultivated crops. Production is somewhat limited because these soils are droughty. If irrigated, these soils are well suited to such crops as potatoes, strawberries, and soybeans. Soils in this unit are suited to pasture crops. The low or moderate available water capacity limits pasture production. Overgrazing is a major concern of pasture management because it exposes the soil and results in soil blowing.

The major soils of this map unit are poorly suited to septic tank absorption fields because of the rapid permeability in the subsoil or substratum. Septic tank effluent drains satisfactorily, but it is not adequately filtered by these soils and may pollute ground water. Where slope is less than 6 percent, the major soils are suited to dwellings. Slope greater than 6 percent is a limitation to septic tank absorption fields and dwellings.

5. Newson-Dawson-Meehan

Nearly level and gently sloping, very poorly drained to somewhat poorly drained peaty and sandy soils; on flood plains, lake basins, and stream terraces

Areas of these soils are on lake basins, stream terraces, or flood plains (fig. 7).

This map unit makes up about 15 percent of the county. It is about 22 percent Newson soils, 21 percent Dawson soils, 10 percent Meehan soils, and 47 percent soils of minor extent.

Newson soils are on lake basins and stream terraces. They are poorly drained. Permeability is rapid. The available water capacity is low. Typically, the surface layer is black loamy sand about 6 inches thick that is covered with about 2 inches of black muck. The subsoil is about 19 inches thick. It is dark gray, mottled loamy sand in the upper part and grayish brown, mottled loamy sand in the lower part. The substratum to a depth of about 60 inches is very pale brown, mottled sand.

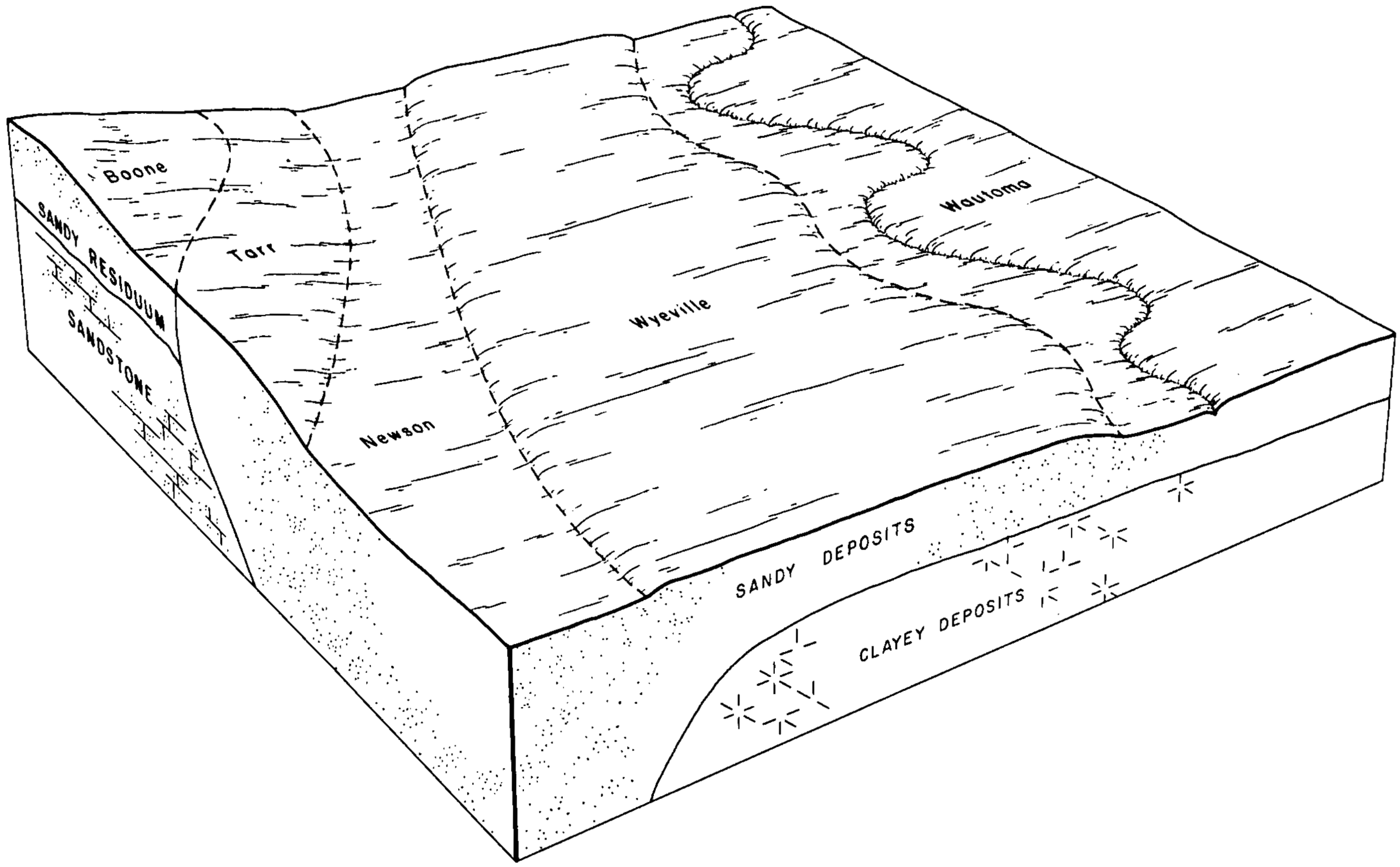


Figure 8.—Relationship of soils and parent material in the Wyeville-Wautoma-Newson map unit.

Dawson soils are on lake basins and flood plains. They are very poorly drained. Permeability is moderately rapid. The available water capacity is very high. Typically, the organic layer is about 42 inches thick. The upper part is dark yellowish brown and dark brown peat, and the lower part is black and very dark gray muck. The substratum to a depth of about 60 inches is pale brown sand.

Meehan soils are on stream terraces and lake basins. They are somewhat poorly drained. Permeability is rapid. The available water capacity is low. Typically, the surface layer is very dark gray and grayish brown sand about 9 inches thick. The subsoil is about 18 inches thick. It is brown, mottled sand in the upper part and pale brown, mottled sand in the lower part. The substratum to a depth of about 60 inches is light gray, mottled sand.

Of minor extent in this map unit are the somewhat poorly drained Au Gres soils on stream terraces and lake basins, the somewhat poorly drained Hoopeston soils on stream terraces and Wyeville soils on lake basins, the moderately well drained and excessively drained Impact and Tarr soils on stream terraces and broad valley slopes, the very poorly drained Loxley soils on lake basins and flood plains, and the poorly drained Wautoma soils on lake basins.

Most areas of these soils are in woodland or in native wetland vegetation. The main limitation is wetness because of a seasonal high water table.

These soils are poorly suited to trees and pasture crops. Most soils of this map unit are poorly suited to cultivated crops because of wetness. Drained soils and soils at slightly higher positions on the landscape are suited to cultivated crops, but production is limited by early frost and low available water capacity. Cranberries are commonly grown under extensive management.

The major soils in this map unit are generally unsuited or poorly suited to septic tank absorption fields and dwellings because of wetness and high organic matter content. Also, the Meehan and Newson soils have sandy horizons that do not adequately filter the effluent.

6. Wyeville-Wautoma-Newson

Nearly level and gently sloping, somewhat poorly drained and poorly drained sandy soils; on lake basins and stream terraces

Areas of these soils are on lake basins and stream terraces (fig. 8).

This map unit makes up about 3 percent of the county. It is about 30 percent Wyeville soils, 20 percent

Wautoma soils, 15 percent Newson soils, and 35 percent soils of minor extent.

Wyeville soils are on lake basins. They are somewhat poorly drained. Permeability is moderately rapid in the sandy mantle and slow or very slow in the clayey subsoil and substratum. The available water capacity is low. Typically, the surface layer is very dark grayish brown loamy sand about 9 inches thick. The subsurface layer is dark brown sand about 18 inches thick that is mottled in the lower part. The subsoil is reddish brown, mottled silty clay about 19 inches thick. The substratum to a depth of about 60 inches is reddish brown, mottled silty clay.

Wautoma soils are on lake basins. They are poorly drained. Permeability is moderately rapid in the sandy mantle and slow or very slow in the lower clayey substratum. The available water capacity is low. Typically, the surface layer is very dark gray sand about 7 inches thick. The substratum to a depth of about 60 inches is gray, mottled sand and loamy sand in the upper 15 inches over yellowish red, mottled clay and reddish brown, mottled silty clay loam and silty clay.

Newson soils are on lake basins and stream terraces. They are poorly drained. Permeability is rapid. The available water capacity is low. Typically, the surface layer is black loamy sand about 6 inches thick that is covered by about 2 inches of black muck. The subsoil is about 19 inches thick. It is dark gray, mottled loamy sand in the upper part and grayish brown, mottled loamy sand in the lower part. The substratum to a depth of about 60 inches is very pale brown, mottled sand in the upper part and light brownish gray sand in the lower part.

Of minor extent in this map unit are the excessively drained Boone soils on valley slopes and ridgetops, the somewhat poorly drained Au Gres and Meehan soils on stream terraces and lake basins, the very poorly drained Dawson and Loxley soils on lake basins and flood plains, the poorly drained Menasha soils on lake basins, and the moderately well drained and excessively drained Tarr soils on broad valley slopes and stream terraces.

Most areas of these soils are used for cultivated crops, but an extensive acreage is in woodland or in wetland vegetation. The main problems are flooding and wetness.

The somewhat poorly drained Wyeville soils in this map unit are suited to cultivated crops, pasture crops, and trees, but the poorly drained Newson and Wautoma soils are generally unsuited to cultivated crops and poorly suited to pasture crops and trees. Drainage helps make all soils in this map unit more suited to cultivated crops, pasture crops, and trees. Soil blowing is a hazard in cultivated areas.

The major soils in this map unit are poorly suited or generally unsuited to septic tank absorption fields and dwellings because of wetness and flooding. The Newson soils are also poorly suited to septic tank absorption fields because they are sandy and do not adequately filter the effluent. The Wautoma and Wyeville soils are also poorly suited to septic tank absorption fields because they have slow or very slow permeability in the clayey substratum.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Downs, 6 to 12 percent slopes, eroded is one of several phases in the Downs series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Valton-Wildale silt loams, 20 to 45 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Meehan and Au Gres sands, 0 to 3 percent slopes, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 3 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

AbA—Abscota loamy sand, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is on flood plains along rivers and large streams. It is subject to occasional flooding. Individual areas of this map unit are long and broad and range from about 80 to 350 acres in size.

Typically, the surface layer is very dark grayish brown loamy sand about 5 inches thick. The substratum to a depth of about 60 inches is brown sand that is mottled below a depth of about 33 inches. In some places, thin strata of mottled silty or loamy deposits are in the substratum.

Included with this soil in mapping are small areas of somewhat poorly drained Dells and poorly drained Kato soils. They are on short, irregular bottom slopes in slight depressions and along drainageways between hummocks of Abscota soils. These inclusions make up from 10 to 15 percent of the map unit.

Permeability is rapid and available water capacity is low in this Abscota soil. The organic matter content of the surface layer is low. This soil has a seasonal high water table at a depth of 2.5 to 5.0 feet. Surface water

runoff is slow. The surface layer is friable and can be easily tilled.

Most areas of this soil are in pastured woodland. A few areas are used for cultivated crops or hay.

This soil is poorly suited to cultivated crops because of flooding and a severe soil blowing hazard. It is poorly suited to pasture, but this use is effective in controlling soil blowing. Forage yields are low unless this soil is fertilized, limed, and irrigated. Pasture grasses should be planted in early spring, before the soil has had a chance to dry. Later plantings have a poor likelihood of survival. Overgrazing leads to a loss of plant cover and results in soil blowing. Fertilization, liming, renovation, irrigation, and controlled grazing help to maintain plant cover.

This soil is suited to trees. The rate of seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings because of flooding, wetness, and rapid permeability. These problems are difficult to overcome, and a building site that is not on a flood plain should be selected.

This soil is poorly suited to local roads because of flooding. To overcome flooding, fill material can be used to construct roads above the flood level and stable overflow sections can be constructed by covering a dip in the road with strong concrete and installing riprap on the sides. Installing larger bridges or culverts to permit the floodwater to drain away also helps.

This soil is in capability subclass IVs and woodland suitability subclass 2s.

AtA—Atterberry silt loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is on broad, slightly concave ridgetops. Individual areas of this map unit are irregular in shape and range from about 3 to 200 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is pale brown, mottled silt loam about 6 inches thick. The subsoil is about 29 inches thick. It is brown, mottled silty clay loam in the upper part and grayish brown, mottled silt loam in the lower part. The substratum to a depth of about 60 inches is grayish brown, mottled silt loam. In some places, the substratum is silty clay loam or cherty clay. Also, in some places, the slope is slightly more than 2 percent.

Included with this soil in mapping are small areas of moderately well drained Downs and well drained Valton soils on convex ridgetops and some areas of poorly drained soils in depressions and drainageways. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate and available water capacity is very high in this Atterberry soil. The organic matter content of the surface layer is moderate. This soil has a seasonal high water table at a depth of 1 foot to 3 feet. Surface water runoff is slow. The surface layer is very friable and can be easily tilled, but tilling when the soil is too moist causes crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Other areas provide wildlife habitat, and many of these areas are used for unimproved pasture. Some areas are in woodland.

Where drained, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Drainage can be improved by using surface drainage ditches and diversions to remove excess surface water more rapidly. Tile drainage improves subsurface drainage where adequate outlets exist. In undrained areas of this soil that are cultivated, tillage or harvest is frequently delayed by wetness. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help to maintain good tilth.

Where drained, this soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover and encourages the growth of undesirable plants. Grazing when the surface layer is wet causes compaction and results in poor tilth. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of wetness. This problem can be overcome by constructing a filtering mound of suitable material. It may also be possible to pump the effluent to an absorption field on higher, more suitable soils.

This soil is poorly suited to dwellings with or without basements because of wetness. For dwellings without basements, wetness can be overcome by installing a subsurface drainage system that has a gravity outlet or other dependable outlet, or by filling the site to raise its level. For dwellings with basements, wetness can be overcome by constructing the basement above the level of wetness or by installing a subsurface drainage system that has a gravity outlet or other dependable outlet.

This soil is poorly suited to local roads and streets because of a danger of frost damage and because the soil does not have sufficient strength to support vehicular traffic. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIw and woodland suitability subclass 2o.

AtB—Atterberry silt loam, 2 to 6 percent slopes. This deep, gently sloping, somewhat poorly drained soil is on broad, slightly concave ridgetops. Individual areas of this map unit are irregular in shape and range from about 3 to 100 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is about 39 inches thick. It is yellowish brown, mottled silty clay loam in the upper part and grayish brown, mottled silt loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam. In some places, the substratum is silty clay loam or cherty clay.

Included with this soil in mapping are small areas of moderately well drained Downs and well drained Valton soils on convex ridgetops and areas of poorly drained soils in depressions. Also included are areas of Atterberry soils that have slopes of less than 2 percent or more than 6 percent. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is moderate and available water capacity is very high in this Atterberry soil. The organic matter content of the surface layer is moderate. This soil has a seasonal high water table at a depth of 1 foot to 3 feet. Surface water runoff from cultivated areas is medium. The surface layer is very friable and can be easily tilled, but tilling when the soil is too moist causes crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Other areas provide wildlife habitat, and many of these areas are used for unimproved pasture. Some areas are in woodland.

Where drained, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Surface drainage ditches, grassed waterways, and diversions are used to improve drainage by removing excess surface water more rapidly. Tile drainage is used for subsurface drainage where adequate outlets exist. In undrained areas of this soil that are cultivated, tillage or harvest is frequently delayed by wetness. Where this soil is cultivated, erosion is a slight or moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, and constructing diversions and grassed waterways help control erosion. These practices, along with regular additions of organic matter, also help to maintain good tilth.

Where drained, this soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover and encourages the growth of undesirable plants. Grazing when the surface layer is wet causes surface compaction, which results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of wetness. This limitation can be overcome by constructing a filtering mound of suitable material. It may also be possible to pump the effluent to an absorption field on higher, more suitable soils.

This soil is poorly suited to dwellings with or without basements because of wetness. For dwellings with basements, wetness can be overcome by installing a subsurface drainage system that has a gravity outlet or other dependable outlet, or by filling the site to raise its level. For dwellings with basements, wetness can be overcome by constructing the basement above the level of wetness or by installing a subsurface drainage system that has a gravity outlet or other dependable outlet.

This soil is poorly suited to local roads and streets because of a danger of frost damage and because the soil does not have sufficient strength to adequately support vehicular traffic. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIe and woodland suitability subclass 2o.

BeB—Bertrand silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on broad, lower toe slopes. Individual areas of this map unit are irregular in shape and range from about 3 to 100 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is about 40 inches thick. It is yellowish brown silt loam and silty clay loam in the upper part, yellowish brown silt loam in the middle, and yellowish brown loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown fine sand. In some places, the substratum is silt loam to a depth of 60 inches. Also, some small areas are underlain by fragmented sandstone or by cherty sand.

Included with this soil in mapping are small areas of moderately well drained Jackson and well drained Meridian soils. Jackson soils are on slightly more concave landscape positions. Meridian soils are on similar positions on the landscape but have more sand in the surface layer and subsoil. Also included are some small pits, some cut and filled areas, and some small areas of Bertrand soils that have slopes of less than 2 percent or more than 6 percent. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Bertrand soil. The available water

capacity is high, and organic matter content of the surface layer is moderate. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some small areas are in woodland. Other areas provide wildlife habitat, and many of these areas are used for unimproved pasture.

This soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Where this soil is cultivated, erosion is a slight or moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, results in erosion, and encourages the growth of undesirable plant species. Grazing when the soil is wet causes surface compaction that results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is suited to septic tank absorption fields. It is only moderately suited to dwellings with or without basements because of the moderate shrink-swell potential in the subsoil. For dwellings without basements, shrinking and swelling of the soil with changes in moisture content can be overcome by excavating the soil and replacing it with a coarse material, such as sand or gravel. Adding lime to the soil also helps to overcome shrinking and swelling. For dwellings with basements, the shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material such as sand or gravel. Increasing the strength of the basement walls and installing a subsurface drainage system around the dwelling at or below the basement elevation also helps prevent damage caused by shrinking and swelling of the soil.

This soil is poorly suited to local roads and streets because of the danger of frost damage and because the soil does not have sufficient strength to adequately support vehicular traffic. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIe and woodland suitability subclass 1o.

BeC2—Bertrand silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on short, uneven toe slopes and foot slopes. Individual areas of this map unit are irregular in shape and range from about 4 to 30 acres in size.

In most cultivated areas, some of the original surface layer has been removed by erosion. Typically, the present surface layer is brown silt loam about 7 inches thick that includes some dark yellowish brown silt loam. The subsoil is about 34 inches thick. It is dark yellowish brown silt loam in the upper part, brown silt loam in the middle, and yellowish brown sandy loam in the lower part. The substratum to a depth of about 60 inches is brownish yellow fine sand. In some places, soft fragmented sandstone or cherty sand are in the substratum.

Included with this soil in mapping are small areas of Billett, Downs, and Meridian soils. Billett soils are on stream terraces and have more sand and less clay in the surface layer and subsoil than the Bertrand soil. The moderately well drained Downs soils are on slightly higher foot slope positions and are silty throughout. Meridian soils are on similar positions on the landscape, but have more sand in the surface layer and subsoil. Also included are a few severely eroded areas on the summit of hills and on upper side slopes where the surface layer is silty clay loam. Also included are some small pits, some cut and filled areas, and small areas of Bertrand soils that have slopes of less than 6 percent or more than 12 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Bertrand soil. The available water capacity is high, and organic matter content of the surface layer is moderate. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland. Other areas provide wildlife habitat, and many of these areas are used for unimproved pasture.

This soil is suited to corn and small grains, and it is well suited to grasses and legumes for hay. Further erosion is a moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, which leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, which results in erosion and encourages the growth of undesirable plant species. Grazing when the soil is wet causes surface compaction that results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is only moderately suited to septic tank absorption fields because of slope. This limitation can be overcome by cutting, by cutting and filling, or by installing a trench absorption system on the contour. It may also be possible to use included areas where the slope is less than 6 percent.

This soil is only moderately suited to dwellings with or without basements because of the moderate shrink-swell potential in the subsoil and because of slope. For dwellings without basements, shrinking and swelling of the soil with changes in moisture content can be overcome by excavating the soil and replacing it with a coarse material, such as sand or gravel, or by adding lime to the soil. For dwellings without basements, the limitation of slope can be overcome by cutting or by cutting and filling to reduce the slope. Included areas where the slope is less than 6 percent may be suitable.

For dwellings with basements, the shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material such as sand or gravel. Increasing the strength of the basement walls and installing a subsurface drainage system around the dwelling at or below the basement level can also help prevent damage caused by shrinking and swelling of the soil. For dwellings with basements, the limitation of slope can be reduced by cutting, by cutting and filling, by making dwellings conform to the slope by constructing retaining walls, or by constructing dwellings on existing slopes in such a way that the basement floor on one side of a house is at ground level. It may also be possible to use included areas where the slope is less than 6 percent.

This soil is poorly suited to local roads and streets because of a danger of frost damage and because the soil does not have sufficient strength to support vehicular traffic. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIIe and woodland suitability subclass 1o.

BlA—Billett sandy loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on broad, slightly convex and plane toe slopes and stream terraces. Individual areas of this map unit are irregular in shape and range from about 5 to 150 acres in size.

Typically, the surface layer is very dark gray sandy loam about 9 inches thick. The subsoil is dark yellowish brown sandy loam about 24 inches thick. The substratum to a depth of about 60 inches is yellowish brown sand. In some places, thin loamy strata are in the substratum, and in some places, the slope is greater than 2 percent.

Included with this soil in mapping are small areas of excessively drained and moderately well drained Impact and Tarr soils on similar landscape positions. These soils are sandy throughout. Also included are somewhat excessively drained Eleva soils on upper valley slopes. Eleva soils are underlain by sandstone. Some areas of moderately well drained Billett soils and somewhat poorly drained Hoopeston soils in depressions and drainageways are also included. Also included are some small pits and some cut and filled areas. These inclusions make up from 10 to 15 percent of the map unit.

Permeability is moderately rapid in the subsoil and rapid in the substratum in this Billett soil. The available water capacity is moderate. The organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is slow. The surface layer is friable and easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland or unimproved pasture.

This soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay, but crop yields during most seasons are limited by the moderate available water capacity. If this soil is irrigated and intensively managed, better and more consistent yields can be produced. Where this soil is cultivated, it is subject to soil blowing. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, wind stripcropping, planting winter cover crops and field windbreaks, and constructing grassed waterways help control water erosion and soil blowing.

This soil is well suited to pasture, but forage yields are generally somewhat limited unless this soil is fertilized and irrigated. Overgrazing leads to a loss of plant cover, which results in soil blowing and encourages the growth of undesirable plants. Fertilization, liming, renovation, and controlled grazing help to increase yields and maintain plant cover.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following

harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil readily absorbs the effluent from septic tanks but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies. This limitation can be overcome by building a filtering mound of suitable material.

This soil is suited to dwellings with or without basements. It is only moderately suited to local roads and streets because of a danger of frost damage. This problem can be overcome by replacing the upper part of the soil with a coarse base material such as sand or gravel.

This soil is in capability subclass IIIs and woodland suitability subclass 3o.

BIB—Billett sandy loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on broad toe slopes and stream terraces. Individual areas of this map unit are irregular in shape and range from about 2 to 100 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 9 inches thick. The subsoil is dark yellowish brown sandy loam about 23 inches thick. The substratum to a depth of about 60 inches is brownish yellow sand. In some places, thin loamy strata are in the substratum, and in places, the depth to the sandy substratum is less than 30 inches. In some places, the slope is less than 2 percent.

Included with this soil in mapping are small areas of excessively drained and moderately well drained Impact and Tarr soils on similar landscape positions. These soils are sandy throughout. Also included are somewhat excessively drained Eleva soils on upper valley slopes. Eleva soils are underlain by sandstone. Some areas of moderately well drained Billett soils and somewhat poorly drained Hoopeston soils in depressions and drainageways are also included. Also included are some small pits and some cut and filled areas. Other inclusions are small areas of Billett soils that have slopes of more than 6 percent. These inclusions make up from 10 to 15 percent of the map unit.

Permeability is moderately rapid in the subsoil and rapid in the substratum in this Billett soil. The available water capacity is moderate. The organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is slow. The surface layer is friable and easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland. Other areas provide wildlife habitat, and many of these areas are used for unimproved pasture.

This soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay, but crop yields during most seasons are limited by the moderate available water capacity. If this soil is irrigated and intensively managed, better and more consistent yields can be produced. Where this soil is cultivated, water erosion is a slight or moderate hazard, and soil blowing may occur as well. Proper management of crop residue, use of a conservation tillage system, such as chisel planting that leaves a protective amount of crop residue on the soil surface, contour farming, wind and contour stripcropping, planting field windbreaks, and constructing diversions and grassed waterways help control water erosion and soil blowing.

This soil is well suited to pasture, but forage yields are generally somewhat limited unless this soil is fertilized and irrigated. Overgrazing leads to a loss of plant cover, resulting in water erosion and soil blowing. Fertilization, liming, renovation, and controlled grazing help to increase yields and maintain plant cover.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies. This limitation can be overcome by building a filtering mound of suitable material.

This soil is suited to dwellings with or without basements. It is only moderately suited to local roads and streets because of a danger of frost damage. This problem can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel.

This soil is in capability subclass IIIs and woodland suitability subclass 3o.

BIC—Billett sandy loam, 6 to 12 percent slopes. This deep, sloping, well drained soil is on short foot slopes and back slopes. Individual areas of this map unit are irregular in shape and range from about 10 to 200 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 8 inches thick. The subsoil is about 31 inches thick. It is brown sandy loam in the upper part and dark yellowish brown sandy loam and loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown sand. In some places, thin loamy strata are in the substratum, and in some places, the depth to the sandy substratum is less than 30 inches.

Included with this soil in mapping are small areas of excessively drained Boone, somewhat excessively drained Eleva soils, and excessively drained Tarr soils. Boone soils formed in sand over sandstone. Eleva soils are underlain by sandstone, and Tarr soils are sandy throughout. Boone and Eleva soils are typically on slightly higher, steeper landscape positions, and Tarr soils are on landscape positions similar to those of Billett

soils. Some small areas of somewhat poorly drained Hoopeston soils are along drainageways. Also included are some small pits, some cut and filled areas, and some small areas of Billett soils that have slopes of less than 6 percent or more than 12 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderately rapid in the subsoil and rapid in the substratum of this Billett soil. The available water capacity is moderate. The organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland. Other areas provide wildlife habitat, and many of these areas are used for unimproved pasture.

This soil is suited to legumes and grasses for hay and to corn, soybeans, and small grains. Crop yields during most seasons are limited by the moderate available water capacity. If this soil is irrigated and intensively managed, better and more consistent yields can be produced, but slope makes irrigation difficult or impractical on most areas of this soil. Where this soil is cultivated, water erosion is a moderate hazard, and soil blowing may occur as well. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, which leaves a protective amount of crop residue on the soil surface, contour farming, wind and contour stripcropping, planting field windbreaks, and constructing diversions and grassed waterways help control water erosion and soil blowing.

This soil is suited to pasture, but forage yields are generally limited unless this soil is fertilized, limed, and irrigated. Overgrazing leads to a loss of plant cover, resulting in water erosion and soil blowing. Fertilization, liming, renovation, and controlled grazing help to increase yields and maintain plant cover.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil readily absorbs the effluent from septic tanks but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies. This limitation can be overcome by building a filtering mound of suitable material.

This soil is only moderately suited to dwellings with or without basements because of slope. For dwellings without basements, slope can be overcome by cutting or by cutting and filling. For dwellings with basements, slope can be overcome by cutting or by cutting and filling, by making dwellings conform to the slope by constructing retaining walls, or by constructing dwellings on the existing slope in such a way that the basement floor on one side of the house is at ground level. It may also be possible to use included areas of Billett soils where the slope is less than 6 percent.

This soil is only moderately suited to local roads and streets because of a danger of frost damage and because of slope. The frost problem can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel. Slope can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass IIIe and woodland suitability subclass 3o.

BID2—Billett sandy loam, 12 to 20 percent slopes, eroded. This deep, moderately steep, well drained soil is on short upper foot slopes and back slopes. Individual areas of this map unit are irregular in shape and range from about 3 to 30 acres in size.

In most cultivated areas, much of the original surface has been removed by erosion. Typically, the surface layer in these areas is mostly dark brown sandy loam about 6 inches thick, but on the crest of slopes, it is mostly brown or dark yellowish brown sandy loam. The subsoil is about 25 inches thick. It is brown sandy loam in the upper part and yellowish brown sandy loam in the lower part. The substratum to a depth of about 60 inches is brownish yellow sand. In some places, thin strata of sandy loam or loamy sand are in the substratum. In some places, the depth to the sandy substratum is less than 30 inches.

Included with this soil in mapping are small areas of Boone, Eleva, and Tarr soils on similar landscaping positions. Boone soils formed in sand over sandstone. Eleva soils are underlain by sandstone, and Tarr soils are sandy throughout. Also included are a few areas of somewhat poorly drained Hoopeston soils along drainageways. Other inclusions are some small pits, some cut and filled areas, and some small areas of Billett soils that have slopes of less than 12 percent or more than 20 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderately rapid in the subsoil and rapid in the substratum of this Billett soil. The available water capacity is moderate. The organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Many areas are in woodland. Other areas provide wildlife habitat, and many of these areas are used for unimproved pasture.

This soil is poorly suited to cultivated crops, but is suited to legumes and grasses for hay. Crop yields during most seasons are limited by moderate available water capacity. Where this soil is used for cultivated crops, further water erosion is a severe hazard, and soil blowing may occur as well. Proper management of crop

residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, wind and contour stripcropping, planting winter cover crops and field windbreaks, and constructing diversions and grassed waterways help control water erosion and soil blowing.

This soil is suited to pasture, and this use is effective in controlling water erosion and soil blowing. Forage yields are generally limited by the low available water capacity. Overgrazing leads to a loss of plant cover, resulting in water erosion and soil blowing. Fertilization, liming, renovation, and controlled grazing help to increase yields and maintain plant cover.

This soil is suited to trees. Soil related limitations to forest management are steepness of slope and plant competition following harvest. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival on steeper slopes facing south or west can be improved by care in planting and use of vigorous planting stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of slope and rapid permeability in the substratum. This soil readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. This poor filtering capacity may result in pollution of the ground water supplies.

This soil is poorly suited to dwellings with or without basements because of slope. For dwellings without basements, slope can be overcome by cutting or by cutting and filling. For dwellings with basements, slope can be overcome by cutting or cutting and filling, by making dwellings conform to the slope by constructing retaining walls, or by constructing dwellings on the existing slope in such a way that the basement floor on one side of the house is at ground level.

This soil is poorly suited to local roads and streets because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass IVe and woodland suitability subclass 3r.

BmA—Billett sandy loam, moderately well drained, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is in slight depressions and along drainageways. Individual areas of this map unit are irregular in shape and range from about 3 to 70 acres in size.

Typically, the surface layer is dark brown sandy loam about 8 inches thick. The subsoil is about 28 inches thick. It is brown sandy loam in the upper part and brown loamy sand in the lower part. The substratum to a depth of about 60 inches is light yellowish brown and pale brown, mottled sand. In some places, the surface layer is loamy sand. In some places, the underlying sand is at a depth of less than 24 inches.

Included with this soil in mapping are small areas of somewhat poorly drained Shiffer soils near drainageways. Shiffer soils contain more clay in the subsoil than Billett soils. Also included are some small areas of well drained Billett soils on higher positions on the landscape and soils that contain less sand and more silt and clay in the subsoil than the Billett soil. Other inclusions are some small pits and some cut and filled areas. These inclusions make up from 5 to 10 percent of the map unit.

Permeability is moderately rapid in the subsoil and rapid in the substratum in this Billett soil. The available water capacity is moderate. Organic matter content of the surface layer is moderately low. This soil has a seasonal high water table at a depth of 3 to 6 feet. Surface water runoff is slow. The surface layer is very friable and easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland.

This soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay, but crop yields during some seasons are limited by moderate available water capacity. With irrigation, better and more consistent yields can be produced. Where this soil is cultivated, water erosion is a slight hazard, and soil blowing may occur as well. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, wind stripcropping, planting winter cover crops and field windbreaks, and constructing grassed waterways help control water erosion and soil blowing.

This soil is well suited to pasture, but forage yields are generally somewhat limited unless this soil is fertilized, limed, and irrigated. Overgrazing leads to a loss of plant cover, resulting in water erosion and soil blowing and encouraging the growth of undesirable plants. Fertilization, liming, renovation, and controlled grazing help to maintain plant cover.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of wetness and rapid permeability in the substratum. It readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies. The wetness and rapid permeability can be overcome by constructing a filtering mound of suitable material. It may also be possible to

pump the effluent to an absorption field on higher, more suitable soils.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of wetness. Wetness can be overcome by constructing the basement above the level of wetness or by installing a subsurface drainage system that has a gravity outlet or other dependable outlet.

This soil is only moderately suited to local roads and streets because of a danger of frost damage. This problem can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel.

This soil is in capability subclass IIIs and woodland suitability subclass 3o.

BnA—Boaz silt loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, somewhat poorly drained soil is on broad flood plains. It is subject to occasional flooding. Individual areas of this map unit are long and narrow and range from about 5 to 100 acres in size.

Typically, the surface layer is very dark gray silt loam about 9 inches thick. The subsoil is about 26 inches thick. It is dark grayish brown, mottled silt loam in the upper part and brown and grayish brown, mottled silt loam in the lower part. The substratum to a depth of about 60 inches is light brownish gray, mottled silt loam.

Included with this soil in mapping are small areas of Curran, Dells, and Kato soils. Kato soils are poorly drained and are on slightly lower positions on the flood plain than the Boaz soil. Curran and Dells soils are somewhat poorly drained and are on slightly higher positions on the landscape. These included soils are underlain by sandy deposits and make up from 2 to 15 percent of the map unit.

Permeability is moderate and the available water capacity is very high in this Boaz soil. The organic matter content of the surface layer is moderate. This soil has a seasonal high water table at a depth of 1 foot to 2.5 feet. Surface water runoff from cultivated areas is slow. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are in woodland. Other areas provide wildlife habitat, and some are also used for unimproved pasture.

Where drained, this soil is well suited to corn and small grains, and to grasses and legumes for hay. Surface drainage ditches and diversions are used to prevent flooding and to remove excess surface water more rapidly. Also, in the few areas where adequate outlets exist, tile drains are used to improve subsurface drainage. In some undrained areas of this soil that are cultivated, tillage and harvest are frequently delayed by wetness. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help prevent scouring by floodwater and maintain good tilth.

Where drained, this soil is well suited to pasture. Grazing when the surface layer is wet causes surface compaction and results in poor tilth. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings with or without basements because of flooding and wetness. These problems are difficult to overcome, and a building site not on a flood plain should be selected.

This soil is poorly suited to local roads because of flooding, a danger of frost damage, and the soil does not have sufficient strength to adequately support vehicular traffic. To overcome flooding, fill material can be used to construct roads above the flood level and stable overflow sections can be constructed by covering a dip in the road with strong concrete and installing riprap on the sides. Installing larger bridges or culverts to permit the floodwater to drain away also helps. Frost damage and low strength can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIw and woodland suitability group 3o.

BoC—Boone sand, 6 to 12 percent slopes. This moderately deep, sloping, excessively drained soil is on narrow convex ridgetops, shoulders, and back slopes. Individual areas of this map unit are long or irregular in shape and range from about 3 to 400 acres in size.

Typically, the surface layer is very dark brown sand about 3 inches thick. It is covered by about 1 inch of leaf litter. The substratum, about 20 inches thick, is dark brown and brown sand. Weakly consolidated sandstone is at a depth of about 23 inches. In some places, the soil is more than 40 inches thick over sandstone. In some areas, thin loamy strata are in the substratum.

Included with this soil in mapping are small areas of somewhat excessively drained Eleva and excessively drained Tarr soils on concave valley slopes. Eleva soils contain more silt and clay in the surface layer and subsoil than Boone soils. Tarr soils are underlain by loose sand throughout. Also included are small pits, some cut and filled areas, and some small areas of Boone soils that have slope of less than 6 percent or

more than 12 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is rapid and the available water capacity is very low in this Boone soil. The organic matter content of the surface layer is low. Surface water runoff from cultivated areas is slow or medium. The surface layer is very friable and easily tilled throughout a wide range in moisture content. Depth of rooting for some cultivated crops is restricted by the sandstone bedrock.

Most areas of this soil are in woodland. A few small areas are used for hay or improved pasture. Some areas are used for unimproved pasture.

This soil is generally unsuited to cultivated crops and to grasses and legumes for hay, because of the very low available water capacity, low natural fertility, and the hazard of soil blowing. If irrigated and fertilized, this soil is suited to corn, soybeans, and small grains and to legumes and grasses for hay. Slope makes irrigation difficult on this soil. Where this soil is cultivated, water erosion is a slight or moderate hazard, and soil blowing may occur as well. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, wind and contour stripcropping, planting field windbreaks, and constructing diversions and grassed waterways help to control water erosion and soil blowing.

This soil is poorly suited to pasture, but this use is effective in controlling water erosion and soil blowing. Forage yields are low unless this soil is fertilized and irrigated. Planting grasses early in spring before the soil has a chance to dry is best on this soil. Later plantings have a poor likelihood of survival. Overgrazing leads to a loss of plant cover, resulting in water erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain plant cover.

This soil is poorly suited to trees because trees grow slowly and tend to have poor form. A poor survival rate of planted trees during dry seasons can be offset by careful planting of vigorous nursery stock. Although production of merchantable wood on this soil may not prove profitable, trees can be very effectively used to control soil blowing and water erosion.

This soil is poorly suited to septic tank absorption fields because of depth to rock and rapid permeability. This soil readily absorbs the effluent from septic tank absorption fields, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies. The depth to rock and rapid permeability can be overcome by constructing a filtering mound of suitable material.

This soil is only moderately suited to dwellings with basements because of slope and to dwellings without basements because of slope and depth to rock. For dwellings without basements, slope can be overcome by cutting or cutting and filling to reduce the slope, or where possible, by using included areas of Boone soil that have slope of less than 6 percent. For dwellings with basements, slope can be overcome by cutting or cutting and filling to reduce the slope, or by making dwellings conform to the slope by constructing retaining walls, or by constructing dwellings on existing slopes in such a way that the basement floor on one side of the house is at ground level. It may also be possible to use included areas of Boone soil where the slope is less than 6 percent. Depth to rock can be overcome by excavating the soft sandstone, by filling the site to raise its level, or by constructing the dwelling with partly exposed basements to avoid excavating the sandstone.

This soil is only moderately suited to local roads and streets because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass VIs and woodland suitability subclass 4s.

BoF—Boone sand, 12 to 45 percent slopes. This moderately deep, moderately steep to very steep, excessively drained soil is on narrow ridgetops, shoulders, and back slopes. In some areas of this map unit, about 2 to 5 percent of the surface is sandstone outcrop. Individual areas of this map unit are irregular in shape and range from about 5 to 1,200 acres in size.

Typically, the surface layer is very dark grayish brown sand about 2 inches thick. It is covered by about 1 inch of leaf litter. The substratum, about 20 inches thick, is strong brown and yellowish brown sand. Weakly consolidated sandstone is at a depth of about 22 inches. In some places, the soil is more than 40 inches thick over sandstone or has thin loamy strata in the substratum. In some places, the slope is less than 12 percent.

Included with this soil in mapping are small areas of Eleva, Gale, Norden, Tarr, and Urne soils. Somewhat excessively drained Eleva and well drained Gale soils are on concave areas on valley slopes. The well drained Norden and somewhat excessively drained Urne soils are mostly at higher elevations above the Boone soils. These included soils have more silt and clay in the surface layer and subsoil than Boone soils. The excessively drained Tarr soils are mostly on foot slopes and are underlain by loose sand throughout. Also included are some small pits and some cut and filled areas. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is rapid and the available water capacity is very low in this Boone soil. The organic matter content of the surface layer is low. Surface water runoff is slow in wooded areas.

Almost all areas are in woodland. A few small areas are used for unimproved pasture.

This soil is unsuited to cultivated crops and to grasses and legumes for hay because of very low available water

capacity, a severe and very severe hazard of water erosion, and a severe hazard of soil blowing.

This soil is poorly suited to pasture, but this use is effective in controlling water erosion and soil blowing. Forage yields are low. On the lesser slopes, where machinery can be operated, it is best to plant in early spring, before the soil has a chance to dry. Later plantings have a poor likelihood of survival. Overgrazing leads to a loss of plant cover, resulting in water erosion and soil blowing. Fertilization, liming, renovation, and controlled grazing help to maintain plant cover.

This soil is poorly suited to trees because trees grow slowly and tend to have poor form. Erosion can be reduced by planting trees on the contour and by careful placement of skidroads. The poor survival rate of planted trees during dry seasons can be offset by careful planting of vigorous nursery stock. Although production of merchantable wood on this soil may not prove profitable, trees can be very effectively used to control soil blowing and water erosion.

This soil is poorly suited to septic tank absorption fields because of depth to rock, rapid permeability, and slope. It is poorly suited to dwellings with or without basements because of slope. Slope is especially difficult to overcome on the steeper parts of this map unit, and a different building site should be selected. On the less sloping areas of this soil, the limitation of depth to rock for septic tank absorption fields can be overcome by constructing a filtering mound of suitable material. Slope can be overcome by cutting, by cutting and filling, or by installing a trench absorption system on the contour. This soil readily absorbs the effluent from septic tanks but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies.

For dwellings without basements, slope can be overcome by cutting or by cutting and filling to reduce the slope. For dwellings with basements, slope can be overcome by cutting or cutting and filling to reduce the slope, or by making dwellings conform to the slope by constructing retaining walls. Another alternative is to construct dwellings on the existing slope in such a way that the basement floor on one side of the house is at ground level.

This soil is poorly suited to local roads and streets because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass VIIs and woodland suitability subclass 4s.

BpF—Boone-Rock outcrop complex, 30 to 70 percent slopes. This map unit consists of areas of a moderately deep, steep and very steep, excessively drained Boone soil and sandstone outcrops on uplands (fig. 9). Individual areas of this map unit are round or oblong in shape and range from about 5 to 40 acres in size. Areas are 45 to 60 percent Boone soil and 30 to 50 percent sandstone outcrops. Areas of the Boone soil and areas of the sandstone outcrops are so intricately mixed or so small that it is not practical to separate them at the scale used in mapping.

Typically, the Boone soil has a surface layer of dark brown sand about 3 inches thick. The substratum, about 21 inches thick, is brown and strong brown sand. Weakly consolidated sandstone is at a depth of about 24 inches.

The Rock outcrop is strongly consolidated sandstone.

Included in mapping are small areas of somewhat excessively drained Eleva soils on back slopes and narrow ridgetops. Eleva soils contain more silt and clay in the surface layer and subsoil than the Boone soil. Also included are some small pits and some cut and filled areas. The inclusions make up from 5 to 10 percent of the map unit.

Permeability is rapid and the available water capacity is very low in the Boone soil. The organic matter content of the surface layer is low. Surface water runoff is slow in wooded areas.

Most areas of this map unit are in woodland. The Boone soil is unsuited to cultivated crops and to grasses and legumes for hay. It is droughty, and if cultivated, has a very severe hazard of water erosion and soil blowing. It is too steep for irrigation. The Boone soil is poorly suited to pasture because of slope and droughtiness.

The Boone soil is poorly suited to trees because trees grow slowly and tend to have poor form. Erosion can be reduced by planting trees on the contour and by careful placement of skidroads. The poor survival rate of planted trees during dry seasons can be offset by careful planting of vigorous nursery stock. Production of merchantable wood on this soil may not prove profitable, but trees can very effectively control soil blowing and erosion.

The Boone soil is generally unsuited to septic tank absorption fields and dwellings because of slope, depth to rock, and rapid permeability. Slope is especially difficult to overcome, and a different building site should be selected.

The Boone soil is poorly suited to local roads because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This complex is in capability subclass VIIs and woodland suitability subclass 4s.

BrF—Brodale flaggy very fine sandy loam, 45 to 80 percent slopes. This deep, very steep, excessively drained soil is on south and west facing convex back slopes. In many areas of this soil, 2 to 10 percent of the surface is sandstone or limestone outcrops. Individual areas of this map unit are long and narrow and range from about 3 to 25 acres in size.

Typically, the surface layer is very dark brown flaggy very fine sandy loam about 10 inches thick. The

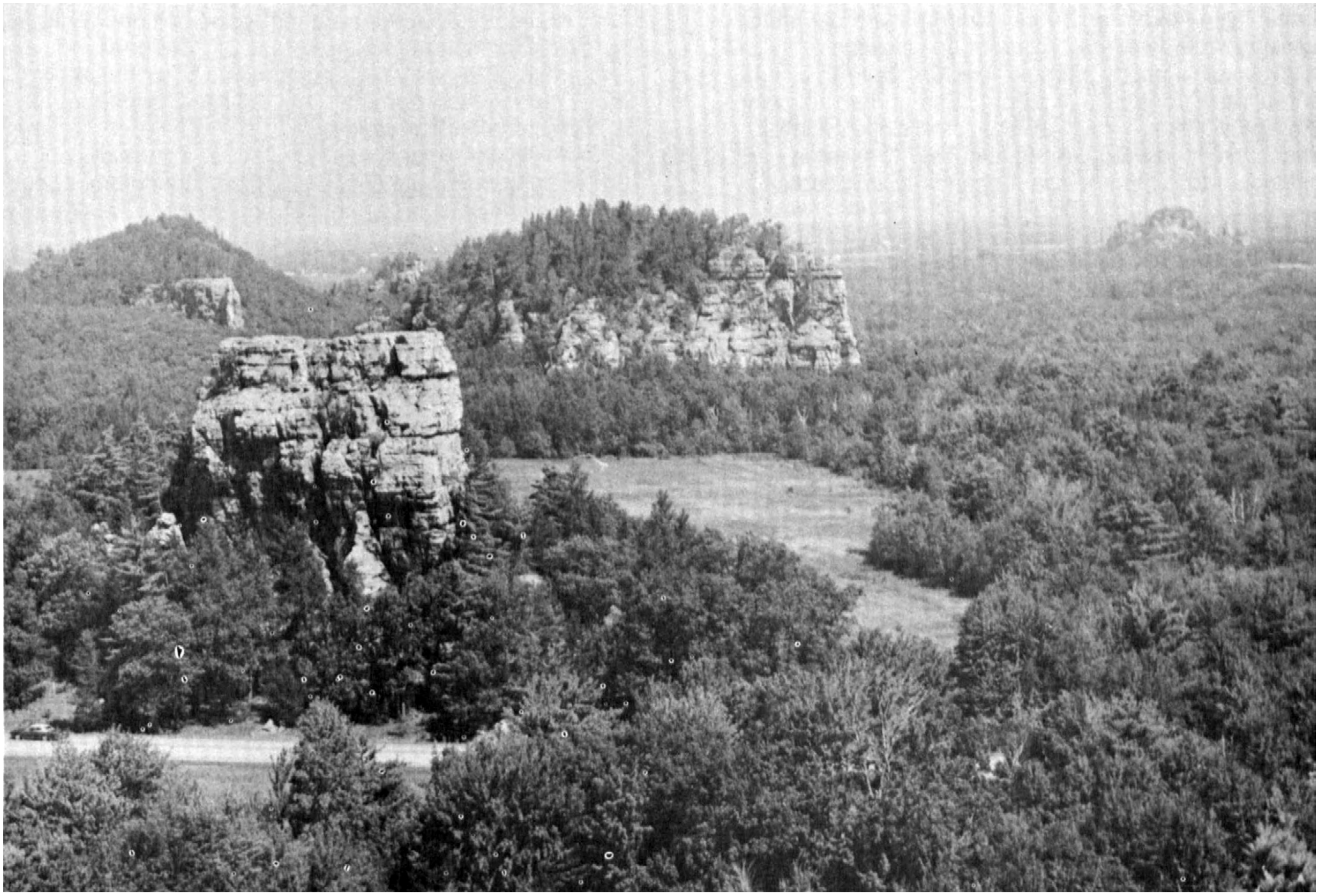


Figure 9.—Areas of Boone-Rock outcrop complex on isolated outliers of sandstone bedrock in Glacial Lake Wisconsin.

subsurface layer is very dark grayish brown very flaggy very fine sandy loam about 4 inches thick. The subsoil is about 13 inches thick. It is brown very flaggy very fine sandy loam in the upper part and dark yellowish brown very flaggy very fine sandy loam in the lower part. The substratum, about 15 inches thick, is yellowish brown very flaggy very fine sandy loam. Light yellowish brown, calcareous sandstone is at a depth of about 42 inches. In some places, limestone is at a depth of less than 20 inches. In some places, the surface layer is flaggy loam, and in other places, the substratum is fragmented sandstone and limestone.

Included with this soil in mapping are small areas of Boone soils on upper convex slopes and Dorerton soils on back slopes and shoulders. Boone soils formed in sand over sandstone. Dorerton soils formed in loamy deposits that are channery in the lower part. Also included are some areas of limestone and sandstone outcrops. These inclusions make up from 2 to 10 percent of the map unit.

Permeability is moderate and available water capacity is low in this Brodale soil. The organic matter content of the surface layer is moderate. Surface water runoff is very rapid.

All areas of this soil are in native prairie and forb vegetation. This soil is unsuited to cultivated crops and is poorly suited to hay or pasture because of low available water capacity and a severe hazard of water erosion.

This soil is not naturally forested and therefore is not commonly managed for woodland.

This soil is generally unsuited to septic tank absorption fields and dwellings with or without basements because of slope. This limitation is difficult to overcome, and a different building site should be selected.

This soil is poorly suited to local roads because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass VIIs. A woodland suitability subclass is not assigned.

CeA—Ceresco fine sandy loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, somewhat poorly drained soil is on flood plains. It is subject to occasional flooding. Individual areas of this map unit are long and narrow and range from about 3 to 225 acres in size.

Typically, the surface layer is very dark brown fine sandy loam about 11 inches thick. The subsurface layer is very dark grayish brown loamy fine sand about 3 inches thick. The subsoil is about 22 inches thick. It is brown, mottled loamy fine sand in the upper part and dark grayish brown and grayish brown, mottled fine sandy loam in the lower part. The substratum to a depth of about 60 inches is grayish brown, mottled silt loam. In some places, the surface layer is loam or silt loam, and in other places, the substratum is gravelly sand. In some places, the slope is slightly greater than 3 percent.

Included with this soil in mapping are small areas of Kickapoo and Lows soils. Kickapoo soils are moderately well drained and are on higher positions on flood plains. Lows soils are poorly drained and are in depressions. They are underlain by sand. These inclusions make up from 2 to 6 percent of the map unit.

Permeability is moderate or moderately rapid in this Ceresco soil. The available water capacity and organic matter content of the surface layer are moderate. This soil has a seasonal high water table at a depth of 1 foot to 2 feet. Surface water runoff is very slow. The surface layer is very friable and easily tilled through a wide range in moisture content.

Most areas of this soil are used for unimproved pasture. Some areas are drained and are used for cultivated crops, hay, and pasture. A few areas are in woodland.

Where drained, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Land smoothing and surface drainage ditches are used to improve drainage by removing excess surface water. In the few areas where they are needed, dikes and diversions can be used to prevent flooding. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help to prevent scouring by floodwater and maintain good tilth.

Where drained, this soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover and encourages the growth of undesirable plant species. Loss of plant cover can also result in erosion during periods of flooding. Grazing when the surface layer is wet causes surface compaction, resulting in poor tilth and reduced water infiltration. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to increase yields and keep the soil and the plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings with or without basements because of flooding and wetness. These problems are difficult to overcome, and a building site should be selected which is not on a flood plain.

This soil is poorly suited to local roads because of flooding and a danger of frost damage. To overcome flooding, fill material can be used to construct roads above the flood level and stable overflow sections can be constructed by covering a dip in the road with strong concrete and installing riprap on the sides. Installing larger bridges or culverts to permit the floodwater to drain away also helps. Frost damage can be overcome by draining the roadbed by subsurface drainage and by replacing the upper part of the soil with a coarse base material, such as sand or gravel.

This soil is in capability subclass IIIw and woodland suitability group 2o.

CfA—Coffeen silt loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, somewhat poorly drained soil is on broad flood plains. It is subject to occasional flooding. Individual areas of this map unit are long and narrow or irregular in shape and range from about 3 to 200 acres in size.

Typically, the surface layer is very dark brown silt loam about 9 inches thick. The subsurface layer is very dark brown silt loam about 4 inches thick. The subsoil is about 21 inches thick. It is dark grayish brown and light brownish gray, mottled silt loam with strata of very fine sandy loam in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown, mottled silt loam.

Included with this soil in mapping are small areas of Ettrick and Lows soils. They are poorly drained and are in depressions and old drainageways. Lows soils are underlain by sand. These inclusions make up from 3 to 7 percent of the map unit.

Permeability is moderate and available water capacity is very high in this Coffeen soil. The organic matter content of the surface layer is moderate. This soil has a seasonal high water table at a depth of 1 foot to 3 feet. Surface water runoff is slow. The surface layer is very friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Drained areas of this soil are used for cultivated crops, hay, or pasture. Undrained areas provide wildlife habitat, and many of these areas are used for unimproved pasture. Some areas are in woodland.

Where drained, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Land grading and surface drainage ditches are used to improve drainage by removing excess surface water. In the areas where they are needed, dikes and

diversions can be used to prevent flooding. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help to prevent scouring by floodwater and maintain good tilth.

Where drained, this soil is well suited to pasture. Grazing when the surface layer is wet causes surface compaction and results in poor tilth. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings with or without basements because of flooding and wetness. These problems are difficult to overcome, and a building site should be selected which is not on a flood plain.

This soil is poorly suited to local roads because of flooding and a danger of frost damage. To overcome flooding, fill material can be used to construct roads above the flood level and stable overflow sections can be constructed by covering a dip in the road with strong concrete and installing riprap on the sides. Installing larger bridges or culverts to permit the floodwater to drain away also helps. Frost damage can be overcome by draining the roadbed by subsurface drainage and by replacing the upper part of the soil with a coarse base material, such as sand or gravel.

This soil is in capability subclass IIw and woodland suitability group 2o.

CnB—Council silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on short toe slopes of valleys. Individual areas of this map unit are irregular in shape and range from about 3 to 20 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is about 29 inches thick. It is brown loam in the upper part and dark yellowish brown loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown loam. In some places, the surface layer is loam or sandy loam. In some places, the slope is slightly less than 2 percent.

Included with this soil in mapping are small areas of Downs and La Farge soils. Downs soils are moderately well drained and are on valley slopes and high stream terraces. La Farge soils are well drained and are on valley slopes. They are partly formed in residuum that is underlain by sandstone bedrock. Also included are small areas of somewhat poorly drained soils in drainageways and depressions and small areas of Council soils that are moderately well drained or that have slope of more than 6 percent. Other inclusions are some small pits and some cut and filled areas. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is moderate and available water capacity is high in this Council soil. The organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland.

This soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Where this soil is cultivated, erosion is a slight or moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth. This increases runoff and the hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is moderately suited to septic tank absorption fields because of moderate permeability. This limitation can be overcome by constructing a filtering mound of suitable material or possibly by increasing the size of the absorption field.

This soil is well suited to dwellings with or without basements. It is only moderately suited to local roads and streets because of a danger of frost damage. Draining the roadbed by surface and subsurface drainage and replacing the upper part of the soil with a coarse base material, such as sand or gravel, reduce frost damage.

This soil is in capabilty subclass IIe and woodland suitability subclass 2o.

CnC—Council silt loam, 6 to 12 percent slopes. This deep, sloping, well drained soil is on foot slopes and toe slopes of valleys. Individual areas of this map unit are irregular in shape and range from about 3 to 50 acres in size.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil is about 44 inches

thick. It is brown loam in the upper part and yellowish brown loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown silt loam. In some places, the surface layer is loam or sandy loam.

Included with this soil in mapping are small areas of Downs, La Farge, and Norden soils. Downs soils are moderately well drained and are on valley slopes. La Farge and Norden soils are well drained and on valley slopes. They are underlain by sandstone. Also included are small areas of somewhat poorly drained soils along drainageways and some small pits and some cut and filled areas. Also included are small areas of Council soils that are moderately well drained or that have slope of less than 6 percent or more than 12 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate and available water capacity is high in this Council soil. The organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Many areas are in woodland. These areas provide wildlife habitat, and many of these areas are used as unimproved pasture.

This soil is suited to grasses and legumes for hay and to corn, soybeans, and small grains. Where this soil is cultivated, erosion is a moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth. This increases runoff and the hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is only moderately suited to septic tank absorption fields because of moderate permeability and slope. The moderate permeability can be overcome by constructing a filtering mound of suitable material or possibly by increasing the size of the absorption field. Slope can be overcome by cutting or cutting and filling to reduce the slope, by installing a trench absorption system on the contour, or where possible, by using included areas of Council soil that have slope of less than 6 percent.

This soil is only moderately suited to dwellings with or without basements because of slope. For dwellings without basements, slope can be overcome by cutting or cutting and filling to reduce the slope. It may also be possible to use included areas of Council soil that have slope of less than 6 percent. For dwellings with basements, slope can be overcome by cutting or cutting and filling to reduce the slope or by making dwellings conform to the slope by constructing retaining walls. The slope limitation can also be overcome by constructing dwellings on existing slopes in such a way that the basement floor on one side of the house is at ground level, or where possible, by using included areas of Council soil that have slope of less than 6 percent.

This soil is only moderately suited to local roads and streets because of slope and a danger of frost damage. Slope can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope. The problem of frost damage can be overcome by draining the roadbed by surface and subsurface drainage and by replacing the upper part of the soil with a coarse base material, such as sand or gravel.

This soil is in capability subclass IIIe and woodland suitability subclass 2o.

CnD—Council silt loam, 12 to 20 percent slopes. This deep, moderately steep, well drained soil is on foot slopes of valleys. Individual areas of this map unit are irregular in shape and range from about 5 to 150 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is about 44 inches thick. It is brown loam in the upper part and yellowish brown loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown silt loam. In some places, the surface layer is loam or sandy loam.

Included with this soil in mapping are small areas of Downs, La Farge, and Norden soils. Downs soils are moderately well drained and are on valley slopes. La Farge and Norden soils are well drained and are on valley slopes. They are underlain by sandstone. Also included are small areas of somewhat poorly drained soils along drainageways and seep areas. Other inclusions are some small pits, some cut and filled areas, and some small areas of Council soil that have slopes of less than 12 percent or more than 20 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate and available water capacity is high in this Council soil. The organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is rapid. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are in woodland, but many areas are used for cultivated crops, hay, or pasture. Some areas are used for unimproved pasture.

This soil is poorly suited to cultivated crops, but it is suited to grasses and legumes for hay. Where this soil is used for cultivated crops, erosion is a severe hazard. Corn, soybeans, and small grains can safely be grown if conservation practices are used. Proper management of crop residue, use of a conservation system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is suited to pasture. This use is effective in controlling erosion. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. Soil related limitations to forest management are associated with steepness of slope and plant competition following harvest. Erosion can be controlled by planting trees on the contour and by careful placement of skidroads during harvest. The rate of seedling survival on steeper slopes facing south or west can be improved by care in planting and use of vigorous planting stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal. Skidding operations may expose sufficient mineral soil to allow adequate regeneration.

This soil is poorly suited to septic tank absorption fields because of slope. This limitation can be overcome by cutting or cutting and filling to reduce the slope or by installing a trench absorption system on the contour.

This soil is poorly suited to dwellings with or without basements because of slope. For dwellings without basements, slope can be overcome by cutting or cutting and filling to reduce the slope or by constructing retaining walls to make dwellings conform to the slope. For dwellings with basements, slope can be overcome by cutting or cutting and filling to reduce the slope or by constructing dwellings on existing slopes in such a way that the basement floor on one side of the house is at ground level.

This soil is poorly suited to local roads and streets because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass IVe and woodland suitability subclass 2r.

CnE—Council silt loam, 20 to 30 percent slopes. This deep, steep, well drained soil is on head slopes of valleys. Individual areas of this map unit are irregular in shape and range from about 3 to 100 acres in size.

Typically, the surface layer is black silt loam about 3 inches thick. The subsoil is about 36 inches thick. It is dark yellowish brown silt loam in the upper part, brown loam in the middle, and strong brown loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown loam. In some places, the surface layer is loam or sandy loam.

Included with this soil in mapping are small areas of Downs, La Farge, or Norden soils. Downs soils are moderately well drained and are on valley slopes. La Farge and Norden soils are well drained and are on valley slopes. They are underlain by sandstone. Also included are small areas of somewhat poorly drained soils along drainageways and in seep areas. Other inclusions are some small pits, some cut and filled areas, and some small areas of Council soil where the slope is less than 20 percent or more than 30 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate and available water capacity is high in this Council soil. The organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is very rapid.

Most areas of this soil are in woodland. Many areas provide wildlife habitat or are used for unimproved pasture. A few areas are used for cultivated crops, hay, or pasture.

This soil is generally unsuited to cultivated crops because of a very severe hazard of erosion.

This soil is suited to pasture. This use is effective in controlling erosion. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. On lesser slopes where machinery can be operated, fertilization, liming, renovation, and controlled grazing and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. Soil related limitations to forest management are associated with steepness of slope and plant competition following harvest. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival on steeper slopes facing south or west can be improved by care in planting and use of vigorous planting stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal. Skidding operations may expose sufficient mineral soil to allow adequate regeneration.

This soil is generally unsuited to septic tank absorption fields and dwellings with or without basements because

of slope. This limitation is difficult to overcome, and a different building site should be selected.

This soil is poorly suited to local roads because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass VIe and woodland suitability subclass 2r.

CuA—Curran silt loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, somewhat poorly drained soil is in slight depressions and along drainageways. It is subject to rare flooding. Individual areas of this map unit are long and narrow and range from about 10 to 40 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is brown, mottled silt loam about 4 inches thick. The subsoil is about 37 inches thick. It is light brownish gray, mottled silt loam in the upper part and grayish brown, mottled silt loam in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown loamy sand. In some places, the substratum is stratified sandy loam, loam, and silt loam or the slope is slightly greater than 3 percent.

Included with this soil in mapping are small areas of poorly drained Ettrick and Kato soils on flood plains. Ettrick soils are silty throughout, and Kato soils are underlain by sand. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Curran soil. The available water capacity is high, and the organic matter content of the surface layer is moderate. This soil has a seasonal high water table at a depth of 1 foot to 3 feet. Surface water runoff is slow. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Drained areas of this soil and some undrained areas are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and many of these areas are used for unimproved pasture. Some areas are in woodland.

Where drained, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Surface drainage ditches are used to remove excess surface water more rapidly. In some areas, deep ditches and tile are used to improve subsurface drainage. However, if tile drains are placed in the underlying sandy deposits, precautions must be taken to prevent loose sand from entering the tile lines. This can be done by placing a filter material, such as topsoil, straw, hay, coarse sand-gravel mixtures, or artificial fabric wrappings, over the tile.

In undrained areas of this soil that are cultivated, tillage or harvest is frequently delayed by wetness. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help prevent scouring by floodwater and maintain good tilth.

Where drained, this soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover and encourages the growth of undesirable plants. Grazing when the surface layer is wet causes surface compaction, resulting in poor tilth and reduced water infiltration. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of wetness. This limitation can be overcome by constructing a filtering mound of suitable material. It may also be possible to pump the effluent to an absorption field on higher, more suitable soils.

This soil is poorly suited to dwellings with or without basements because of flooding and wetness. For dwellings without basements, wetness and flooding can be overcome by filling the site to raise its level. Also, the floodwaters can be diverted from the dwelling by a diversion or dike, and wetness can be overcome by installing a subsurface drainage system that has a gravity outlet or other dependable outlet. For dwellings with basements, flooding can be overcome by filling the site to raise its level or by constructing a diversion or dike to divert water from the dwelling. The flooding limitation can also be overcome by using surface drainage to remove water, by shaping the construction site, and by constructing diversions. Wetness can be overcome by constructing basements above the level of wetness, and by installing a subsurface drainage system that has a gravity outlet or other dependable outlet.

This soil is poorly suited to local roads and streets because of a danger of frost damage and because this soil does not have sufficient strength to adequately support vehicular traffic. These problems can be overcome by replacing the upper part of the soil with coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIw and woodland suitability subclass 3o.

Dc—Dawson peat. This deep, nearly level, very poorly drained soil is in large depressions. It is subject to ponding. Individual areas of this map unit are long and narrow on flood plains and irregular in shape on lake basins. They range from about 3 to 1,200 acres in size.

Typically, the organic layer is about 42 inches thick. The upper part is dark yellowish brown and dark brown

peat, and the lower part is black and very dark gray muck. The substratum to a depth of about 60 inches is pale brown sand.

Included with this soil in mapping are small areas of Loxley and Newson soils. Loxley soils are very poorly drained, deep organic soils near the center of depressions. Newson soils are poorly drained sandy soils near the edge of depressions. Also included are soils that are similar to Dawson soils but are underlain by silt loam, loam, or sandy loam. Also included are some areas of silty alluvium, 1 foot to 3 feet thick, over organic material. These inclusions make up from 0 to 10 percent of the map unit.

Permeability is moderately rapid in this Dawson soil. The available water capacity and organic matter content are very high. This soil has a seasonal high water table above the surface or within 1 foot of the surface. Surface water runoff is very slow or ponded. Flooding commonly occurs in a few areas of this soil on flood plains.

Most areas of this soil support stands of native wetland vegetation.

This soil is generally unsuited to cultivated crops. It is wet, and frost damages crops. Because of cold air drainage, there are fewer frost-free days per growing season on this soil than on adjacent upland soils. A few areas of this soil have been drained and are used for short-season crops. Sprinkler systems are used to help prevent crop damage by frost. Soil subsidence and soil blowing are problems if this soil is drained and cultivated. If intensively managed, some areas of this soil are suited to cranberries and other specialty crops.

This soil is poorly suited to pasture because it is saturated by water that remains close to the surface for long periods of time.

This soil is not suited to woodland because it does not support tree growth of merchantable size and quality. Good land use may include management of woody cover for recreation use or wildlife habitat.

This soil is generally unsuited to septic tank absorption fields and dwellings because of ponding and because it does not have sufficient strength to properly support building foundations. These problems are difficult to overcome, and a different building site should be selected.

This soil is poorly suited to local roads because it does not have sufficient strength to adequately support vehicular traffic and because of ponding and a danger of frost damage. Low strength and frost damage can be overcome by excavating the organic layers and replacing them with a coarse base material, such as sand or gravel, and by increasing the thickness of pavement. Ponding can be overcome by removing surface water through suitable outlets with culverts and ditches or by using fill material to construct roads above the ponding level. Installing culverts also helps prevent road damage by equalizing the water level on both sides of the road.

This soil is in capability subclass VIw undrained. A woodland suitability subclass is not assigned.

DdA—Dells silt loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, somewhat poorly drained soil is in slight depressions and along drainageways. It is subject to rare flooding. Individual areas of this map unit are irregular in shape and range from about 3 to 60 acres in size.

Typically, the surface layer is very dark gray silt loam about 9 inches thick. The subsoil is about 24 inches thick. It is brown, mottled silt loam in the upper part and grayish brown, mottled loam in the lower part. The substratum to a depth of about 60 inches is light gray, mottled sand that has thin strata of silt loam.

Included with this soil in mapping are small areas of Kato soils. Kato soils are poorly drained and are on flood plains. This inclusion makes up from 2 to 5 percent of the map unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Dells soil. The available water capacity and organic matter content of the surface layer are moderate. This soil has a seasonal high water table at a depth of 1 foot to 3 feet. Surface water runoff is slow. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes crusting.

Drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and many of these areas are used for cropland or unimproved pasture. Some areas are in woodland.

Where drained, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Surface drainage ditches are used to remove excess surface water more rapidly. In some areas, deep ditches and tile are used to improve subsurface drainage. However, where tile are placed in the underlying sand, precautions must be taken to prevent loose sand from entering the tile lines. This can be done by placing a filter material, such as topsoil, straw, hay, coarse sand-gravel mixtures, or artificial fabric wrappings, over the tile. Ditchbanks are easily eroded by flowing water, and vertical banks are likely to cave and plug the ditch. In undrained areas of this soil that are cultivated, tillage or harvest is frequently delayed by wetness. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help prevent scouring by floodwater and maintain good tilth.

Where drained, this soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover and encourages the growth of undesirable plants. Grazing when the surface layer is wet causes surface compaction, resulting in poor tilth and increased runoff. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of wetness and rapid permeability in the substratum. These problems can be overcome by constructing a filtering mound of suitable material. It may also be possible to overcome wetness by pumping the effluent to an absorption field on higher, more suitable soils.

This soil is poorly suited to dwellings with or without basements because of flooding and wetness. For dwellings without basements, wetness and flooding can be overcome by filling the site to raise its elevation. Also, the floodwaters can be diverted from the dwelling by a diversion or dike, and the wetness can be overcome by installing a subsurface drainage system that has a gravity outlet or other dependable outlet. For dwellings with basements, flooding can be overcome by filling the site to raise its level or by constructing a diversion or dike to divert water from the dwelling. Flooding can also be overcome by using surface drainage to remove water, by shaping the construction site, and by using diversions. Wetness can be overcome by constructing basements above the level of wetness and by installing a subsurface drainage system that has a gravity outlet or other dependable outlet.

This soil is poorly suited to local roads and streets because of a danger of frost damage and because this soil does not have sufficient strength to adequately support vehicular traffic. These problems can be overcome by replacing the upper part of the soil with coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIw and woodland suitability subclass 3o.

DIA—Downs silt loam, 0 to 2 percent slopes. This deep, nearly level, moderately well drained soil is on high, slightly concave and plane stream terraces and on long, broad, slightly convex ridgetops. Individual areas of this map unit are irregular in shape and range from about 3 to 50 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsoil is about 36 inches thick. It is dark yellowish brown silt loam in the upper part, dark yellowish brown, mottled silt loam in the middle, and yellowish brown, mottled silt loam in the lower part. The substratum to a depth of about 60 inches is brown and grayish brown, mottled silt loam (fig. 10). In some places, sand, clay, or weathered sandstone is at a depth of 40 to 60 inches.

Included with this soil in mapping are small areas of Atterberry, Bertrand, Gale, La Farge, and Valton soils.

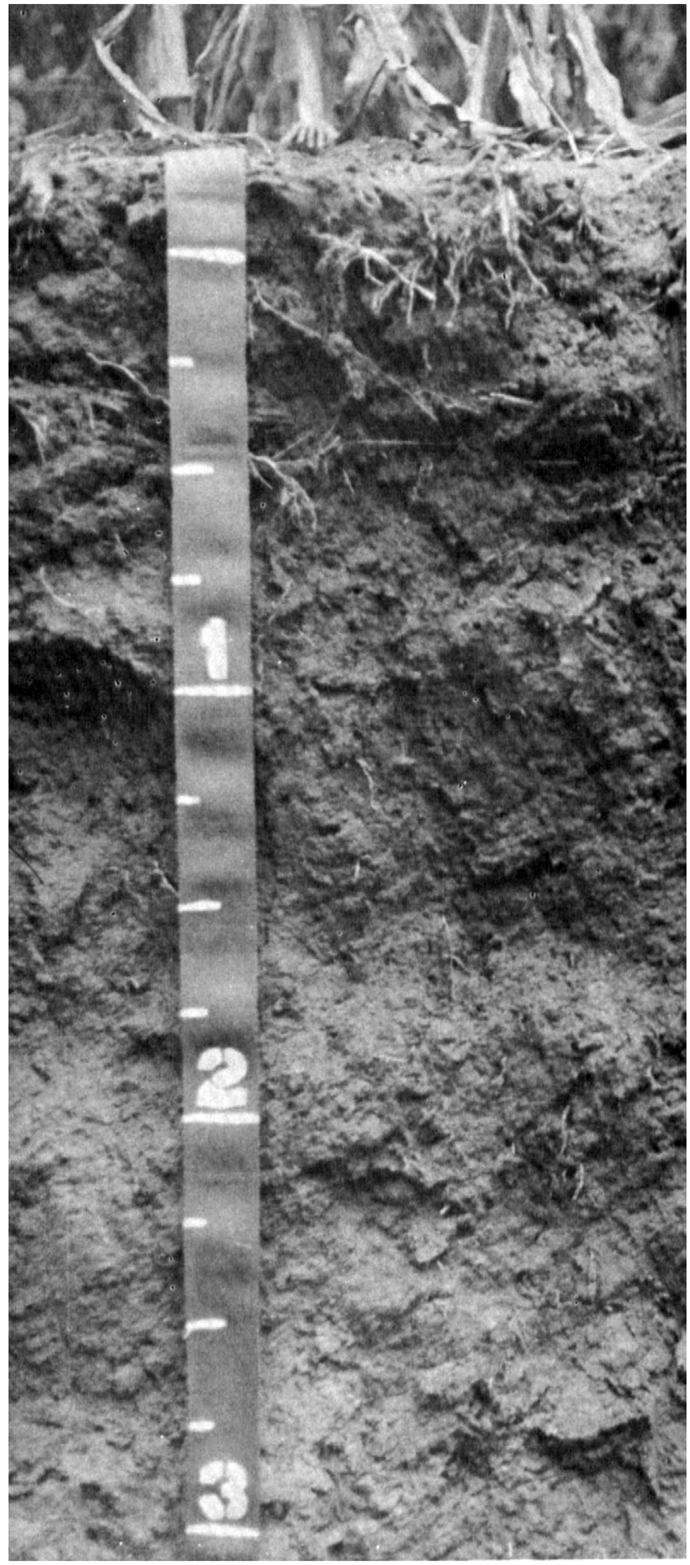


Figure 10.—Profile of Downs silt loam. This soil formed in loess or other silty deposits and is mottled in the lower part of the subsoil. Measure is in feet.

The somewhat poorly drained Atterberry soils are on ridgetops. Bertrand soils are on stream terraces and valley slopes and are underlain by fine sand. The well drained Gale, La Farge, and Valton soils are on ridgetops and valley slopes. Valton soils are clayey in the lower part of the subsoil. Also included are small areas of Downs soils that have slopes greater than 2 percent. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is moderate and available water capacity is high in this Downs soil. The organic matter content of the surface layer is moderate. This soil has a seasonal high water table at a depth of 3 to 6 feet. Surface water runoff from cultivated areas is slow. The surface layer is very friable and easily tilled, but tilling when the soil is too moist causes crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland. Other areas are used for unimproved pasture.

This soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the the soil surface help maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction, resulting in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is only moderately suited to septic tank absorption fields because of wetness. This limitation can be overcome by constructing a filtering mound of suitable material or by pumping the effluent to an absorption field on more suitable soils.

This soil is only moderately suited to dwellings with or without basements because of the moderate shrink-swell potential. Shrinking and swelling of the soil with changes in moisture content can be overcome by excavating the soil and replacing it with coarse material, such as sand or gravel. For dwellings with basements, the limitations are wetness and shrinking and swelling. Wetness can be overcome by constructing basements above the level of wetness or by installing a subsurface drainage system that has a gravity outlet or other dependable outlet. Shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material, such as sand or gravel.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of the danger of frost damage. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability class I and woodland suitability subclass 2o.

DIB—Downs silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on broad, convex ridgetops, toe slopes, and high stream terraces. Individual areas of this map unit are irregular in shape and range from about 4 to 1,000 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 31 inches thick. It is dark yellowish brown silt loam in the upper part and yellowish brown, mottled silt loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam. In some places, the substratum contains strata of sand, clay, or weathered sandstone at a depth of 40 to 60 inches.

Included with this soil in mapping are small areas of Atterberry, Bertrand, Gale, La Farge, and Valton soils. The somewhat poorly drained Atterberry soils are on ridgetops. Bertrand soils are on stream terraces and valley slopes and are underlain by fine sand. The well drained Gale, La Farge, and Valton soils are on ridgetops and valley slopes. Gale and La Farge soils are underlain by sandstone. Valton soils are clayey in the lower part of the subsoil. Also included are small areas of Downs soils that have slopes of less than 2 percent or more than 6 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate and available water capacity is high in this Downs soil. The organic matter content of the surface layer is moderate. This soil has a seasonal high water table at a depth of 3 to 6 feet. Surface water runoff from cultivated areas is medium. The surface layer is very friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland. Some areas are used for unimproved pasture.

This soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Where this soil is cultivated, erosion is a slight or moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and

grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction, which results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is only moderately suited to septic tank absorption fields because of wetness. This limitation can be overcome by constructing a filtering mound of suitable material or pumping the effluent to an absorption field on suitable soils.

This soil is only moderately suited to dwellings with or without basements because of the moderate shrink-swell potential. Shrinking and swelling of the soil with changes in moisture content can be overcome by excavating the soil and replacing it with coarse material, such as sand or gravel. For dwellings with basements, the limitations are wetness and shrinking and swelling. Wetness can be overcome by constructing basements above the level of wetness or by installing a subsurface drainage system that has a gravity outlet or other dependable outlet. Shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material, such as sand or gravel.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of a danger of frost damage. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIe and woodland suitability subclass 2o.

DlC2—Downs silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, moderately well drained soil is on broad, convex ridgetops and foot slopes of valleys. Individual areas of this map unit are long and narrow or irregular in shape and range from about 3 to 275 acres in size.

In most cultivated areas, some of the original surface layer on the crest of slopes has been removed by erosion. Typically, the present surface layer is mostly very dark grayish brown silt loam about 8 inches thick and includes some dark yellowish brown or grayish brown silt loam. The subsoil is about 41 inches thick. It is dark yellowish brown silt loam in the upper part, yellowish brown silty clay loam in the middle, and yellowish brown, mottled silt loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam. In some places, the substratum contains strata of sand, clay, or weathered sandstone at a depth of 40 to 60 inches.

Included with this soil in mapping are small areas of Bertrand, Gale, La Farge, and Valton soils. The well drained Bertrand soils are on stream terraces and valley slopes and are underlain by fine sand. The well drained Gale, La Farge, and Valton soils are on ridgetops and valley slopes. Gale and La Farge soils are underlain by sandstone. Valton soils are clayey in the lower part of the subsoil. Also included are some areas of Downs soils that have slopes of less than 6 percent or more than 12 percent and some severely eroded areas in which the surface layer is silty clay loam. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate and available water capacity is high in this Downs soil. The organic matter content of the surface layer is moderate. This soil has a seasonal high water table at a depth of 3 to 6 feet. Surface water runoff from cultivated areas is rapid. The surface layer is very friable and easily tilled, but tilling when the soil is too moist causes crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland. Some areas are used for unimproved pasture.

This soil is suited to grasses and legumes for hay and to corn, soybeans, and small grains. Where this soil is cultivated, further erosion is a moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth (fig. 11).

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in further erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction, resulting in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is only moderately suited to septic tank absorption fields because of wetness and slope. Wetness can be overcome by constructing a filtering

Figure 11.—This grassed waterway on the sloping Downs soil permits the removal of runoff water coming from the surrounding corn field without causing gully formation.

mound of suitable material or by pumping the effluent to an absorption field on suitable soils. Reducing the slope by cutting or cutting and filling or installing a trench absorption system on the contour can help to overcome the slope limitation. It may also be possible to use included areas of Downs soils where the slope is less than 6 percent.

This soil is only moderately suited to dwellings with or without basements. For dwellings without basements, the moderate shrink-swell potential and slope are limitations. The shrinking and swelling of the soil with changes in moisture content can be overcome by excavating the soil and replacing it with a coarse material, such as sand or gravel. Slope can be overcome by cutting or cutting and filling to reduce the slope, or where possible, by using included areas of Downs soils where the slope is less than 6 percent.

For dwellings with basements, the limitations are wetness, slope, and shrink-swell potential. Wetness can be overcome by constructing basements above the level of wetness or by installing a subsurface drainage system that has a gravity outlet or other dependable outlet. Slope can be overcome by cutting or cutting and filling to reduce the slope or by making dwellings conform to the slope by constructing retaining walls. Slope can also be overcome by constructing dwellings on existing slopes in such a way that the basement floor on one side of the house is at ground level, and where possible, by using included areas of Downs soils where the slope is less than 6 percent. Shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material, such as sand or gravel.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of a danger of frost damage. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIIe and woodland suitability subclass 2o.

DlD2—Downs silt loam, 12 to 20 percent slopes, eroded. This deep, moderately steep, moderately well drained soil is on foot slopes. Individual areas of this

map unit are long and narrow or irregular in shape and range from about 3 to 175 acres in size.

In most cultivated areas, some of the original surface layer has been removed by erosion. Typically, the present surface layer is mostly very dark grayish brown silt loam about 7 inches thick that includes some brown and dark yellowish brown silt loam. The subsoil is about 35 inches thick. It is dark yellowish brown silt loam in the upper part, dark yellowish brown silty clay loam in the middle, and yellowish brown, mottled silt loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam. In some places, the substratum does not have mottles, and in places, it contains strata of sand, clay, or weathered sandstone at a depth of 40 to 60 inches.

Included with this soil in mapping are small areas of well drained Gale, La Farge, and Valton soils on ridgetops and valley slopes. Gale and La Farge soils are underlain by sandstone. Valton soils are clayey in the lower part of the subsoil. Also included are small, severely eroded areas of Downs soils that have a surface layer of silty clay loam. Also included are some soils that are similar to Downs soils but are well drained. These inclusions make up about 5 to 15 percent of the map unit.

Permeability is moderate and available water capacity is high in this Downs soil. The organic matter content of the surface layer is moderate. This soil has a seasonal high water table at a depth of 3 to 6 feet. Surface water runoff from cultivated areas is rapid. The surface layer is very friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland. Some areas are used for unimproved pasture.

This soil is poorly suited to cultivated crops, but it is suited to grasses and legumes for hay. Where this soil is used for cultivated crops, further erosion is a severe hazard. Corn, soybeans, and small grains can safely be grown if conservation practices are used. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and installing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. This use is effective in controlling erosion. Overgrazing, however, leads to a loss of plant cover, resulting in further erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction, resulting in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. Soil related limitations to forest management are steepness of slope and plant mortality following harvest. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival on south- and west-facing slopes can be improved by care in planting and use of vigorous planting stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal. Skidding operations may expose sufficient mineral soil to allow adequate regeneration.

This soil is poorly suited to septic tank absorption fields because of slope. This limitation can be overcome by cutting or cutting and filling to reduce the slope or by installing a trench absorption system on the contour.

This soil is poorly suited to dwellings with or without basements because of slope. For dwellings without basements, slope can be overcome by cutting or cutting and filling to reduce the slope. For dwellings with basements, slope can be overcome by cutting or cutting and filling to reduce the slope, by using retaining walls to make dwellings conform to the slope, or by constructing dwellings on the existing slope in such a way that the basement floor on one side of a house is at ground level.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic, because of slope, and because of a danger of frost damage. Low strength and frost damage can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage. Slope can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass IVe and woodland suitability subclass 2r.

EIC—Eleva sandy loam, 6 to 12 percent slopes. This moderately deep, sloping, somewhat excessively drained soil is on narrow ridgetops, back slopes, and shoulders. Individual areas of this map unit are round or irregular in shape and range from about 3 to 80 acres in size.

Typically, the surface layer is dark brown sandy loam about 9 inches thick. The subsoil is about 19 inches thick. It is dark yellowish brown loam in the upper part and dark yellowish brown fine sandy loam in the lower part. The substratum, about 9 inches thick, is strong brown sand. Brownish yellow, weakly consolidated sandstone is at a depth of about 37 inches. In some places, the lower part of the subsoil is loamy sand. In some places, loamy strata are in the sandy substratum, and in other places, sandstone is at a depth of more than 40 inches.

Included with this soil in mapping are small areas of Boone, Gale, and Tarr soils. The excessively drained Boone soils are on steeper back slopes and shoulders and formed in sandy deposits over sandstone. The well drained Gale soils are on ridgetops and valley slopes that have a silty mantle. The excessively drained Tarr soils are on lower foot slopes and are sandy throughout. Also included are some small pits, some cut and filled areas, and a few areas of Eleva soils that have slopes of less than 6 percent or more than 12 percent. These inclusions make up from 2 to 8 percent of the map unit.

Permeability is moderate or moderately rapid in this Eleva soil. The available water capacity and organic matter content of the surface layer are low. Surface water runoff from cultivated areas is medium. The surface layer is very friable and easily tilled throughout a wide range in moisture content. Depth to rooting for most cultivated crops is restricted by sandstone bedrock.

Most areas of this soil are in woodland. A few areas are used for cultivated crops, hay, or pasture. Some areas are used for umimproved pasture.

This soil is suited to legumes and grasses for hay and to corn, soybeans, and small grains. Crop yields during most seasons are limited by low available water capacity. If this soil is irrigated, better and more consistent yields can be produced, but slope makes irrigation difficult. Where this soil is cultivated, water erosion is a moderate hazard, and soil blowing may also occur. Erosion has serious consequences on this soil because it reduces the thickness of soil over the sandstone bedrock. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, wind and contour stripcropping, planting field windbreaks and winter cover crops, and constructing diversions and grassed waterways help control erosion and soil blowing.

This soil is well suited to pasture, but forage yields are generally somewhat limited by low available water capacity. Overgrazing leads to a loss of plant cover, resulting in soil blowing and encouraging the growth of undesirable plants. Fertilization, liming, renovation, and controlled grazing help to increase yields and maintain plant cover.

This soil is suited to trees. Trees grow slowly and have poor form, and commonly attain only minimum merchantability. Soil related limitations to forest management are minor.

This soil is poorly suited to septic tank absorption fields because of depth to rock. This limitation can be overcome by constructing a filtering mound of suitable material.

This soil is only moderately suited to dwellings with or without basements because of slope and depth to rock. For dwellings without basements, slope can be overcome by cutting or cutting and filling to reduce the slope, or where possible, by using included areas of this soil that have slope of less than 6 percent. For dwellings with basements, slope can be overcome by cutting or cutting and filling to reduce the slope or by making dwellings conform to the slope by constructing retaining walls. Dwellings can also be constructed on existing slopes in such a way that the basement floor on one side of house is at ground level. It may also be possible to use included areas of Eleva soil, where the slope is less than 6 percent. The limitation of depth to rock for dwellings with basements can be overcome by excavating the soft sandstone with suitable power equipment, by filling to raise the site level, or by constructing the dwelling with partly exposed basements to avoid excavating the sandstone.

This soil is only moderately suited to local roads and streets because of slope and a danger of frost damage. Slope can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope. The problem of frost damage can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel.

This soil is in capability subclass IIIe and woodland suitability subclass 4o.

ElD—Eleva sandy loam, 12 to 20 percent slopes. This moderately deep, moderately steep, somewhat excessively drained soil is on back slopes and shoulders. Individual areas of this map unit are long and narrow and range from about 5 to 50 acres in size.

Typically, the surface layer is dark grayish brown sandy loam about 7 inches thick. The subsoil is about 18 inches thick. It is yellowish brown sandy loam in the upper part, yellowish brown loam in the middle, and light yellowish brown sandy loam in the lower part. The substratum, about 8 inches thick, is brownish yellow sand. Very pale brown, weakly consolidated sandstone is at a depth of about 33 inches. In some places, the lower part of the subsoil is loamy sand. In some places, loamy strata are in the sandy substratum, and in other places, sandstone is at a depth of more than 40 inches.

Included with this soil in mapping are small areas of Boone, Gale, and Tarr soils. The excessively drained Boone soils are on steeper back slopes and shoulders and formed in sandy deposits over sandstone. The well drained Gale soils are on ridgetops and valley slopes where there is a silty mantle. The excessively drained Tarr soils are on lower foot slopes and are sandy throughout. Also included are some small pits, some cut and filled areas, and a few areas of Eleva soils that have slopes of less than 12 percent or more than 20 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate or moderately rapid in this Eleva soil. The available water capacity and organic matter content of the surface layer are low. Surface water runoff from cultivated areas is rapid. The surface layer is very friable and easily tilled throughout a wide

range in moisture content. Depth of rooting for most cultivated crops is restricted by the sandstone bedrock.

Most areas of this soil are in woodland. Some areas are used for hay or improved pasture. Some areas are used for unimproved pasture.

This soil is poorly suited to cultivated crops, but it is suited to legumes and grasses for hay. Crop yields during most seasons are limited by the low available water capacity. Where this soil is cultivated, water erosion is a hazard, and soil blowing may also occur. Erosion has serious consequences on this soil because it reduces the thickness of soil over the sandstone. Proper management of crop residue, use of a conservation tillage system, such a chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, wind and contour stripcropping, planting field windbreaks and winter cover crops, and constructing diversions and grassed waterways help control erosion and soil blowing.

This soil is suited to pasture, but forage yields are somewhat limited because of the low available water capacity. This use is effective in controlling erosion. Overgrazing leads to a loss of plant cover, resulting in soil blowing and encouraging the growth of undesirable plants. Fertilization, liming, renovation, and controlled grazing help to increase yields and maintain plant cover.

This soil is poorly suited to trees. Soil related limitations to forest management are associated with steepness of slope. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival on steeper slopes facing south and west can be improved by care in planting and use of vigorous planting stock.

This soil is poorly suited to septic tank absorption fields because of depth to rock and slope. Depth to rock can be overcome by constructing a filtering mound of suitable material. Slope can be overcome by cutting, by cutting and filling, or by installing a trench absorption system on the contour.

This soil is poorly suited to dwellings with or without basements because of slope. For dwellings without basements, slope can be overcome by cutting or cutting and filling to reduce the slope. For dwellings with basements, slope can be overcome by cutting or cutting and filling to reduce the slope or by making dwellings conform to the slope by using retaining walls. Dwellings can also be constructed on existing slopes in such a way that the basement floor on one side of the house is at ground level.

This soil is poorly suited to local roads and streets because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass IVe and woodland suitability subclass 4r.

EIE—Eleva sandy loam, 20 to 45 percent slopes. This moderately deep, steep and very steep, somewhat excessively drained soil is on back slopes and shoulders. Individual areas of this map unit are long and narrow and range from about 10 to 500 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 2 inches thick. The subsoil is about 26 inches thick. It is dark yellowish brown sandy loam in the upper part, yellowish brown loam in the middle, and dark yellowish brown sandy loam in the lower part. Brownish yellow, weakly consolidated sandstone is at a depth of about 28 inches. In some places, the subsoil is mostly loamy sand. In some places, loamy strata are in the sandy substratum, and in other places, sandstone is at a depth of more than 40 inches.

Included with this soil in mapping are small areas of Boone, Gale, and Tarr soils. The excessively drained Boone soils are on similar landscape positions and formed in sandy deposits over sandstone. The well drained Gale soils are on ridgetops and valley slopes where there is a silty mantle. The excessively drained Tarr soils are on lower foot slopes and are sandy throughout. Also included are some small pits, some cut and filled areas, and a few areas of Eleva soils that have slopes of less than 20 percent or more than 45 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate or moderately rapid in this Eleva soil. The available water capacity and organic matter content of the surface layer are low. Surface water runoff is medium or rapid.

Most areas of this soil are in woodland. Some areas are used for unimproved pasture.

This soil is generally unsuited to cultivated crops because of the very severe hazard of water erosion, the hazard of soil blowing, and the low available water capacity. The less sloping areas are suited to grasses and legumes for hay.

This soil is suited to pasture. This use is effective in controlling erosion, but forage yields are generally somewhat limited because of the low available water capacity. Overgrazing leads to a loss of plant cover, resulting in soil blowing and encouraging the growth of undesirable plants. Fertilization, liming, renovation where machinery operation is possible, and controlled grazing help to increase yields and maintain plant cover.

This soil is poorly suited to trees. Soil related limitations to forest management are associated with steepness of slope. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival on steeper slopes facing south or west can be improved by care in planting and use of vigorous planting stock.

This soil is generally unsuited to septic tank absorption fields and dwellings because of depth to rock and slope. The slope limitation is especially difficult to overcome, and a different building site should be selected.

This soil is poorly suited to local roads because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass VIe and woodland suitability subclass 4r.

Et—Ettrick silt loam. This deep, nearly level, poorly drained soil is in depressions and along drainageways. It is subject to frequent flooding and to ponding. Individual areas of this map unit are round or irregular in shape and range from about 3 to 100 acres in size.

Typically, the surface layer is very dark gray silt loam about 10 inches thick. The subsurface layer is black, mottled silt loam about 6 inches thick. The subsoil is about 19 inches thick. It is dark gray, mottled silt loam in the upper part and gray, mottled silt loam in the lower part. The substratum to a depth of about 60 inches is gray silt loam. In some places, the surface layer is silty clay loam or muck.

Included with this soil in mapping are small areas of Boaz, Coffeen, Curran, Dells, and Lows soils. Boaz and Coffeen soils formed in similar deposits but are somewhat poorly drained and are on slightly higher positions on flood plains. Curran and Dells soils are somewhat poorly drained and are on stream terraces. They are underlain by sandy deposits. Lows soils are poorly drained and are in depressions. They are underlain by sand. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderately slow and available water capacity is very high in this Ettrick soil. The organic matter content of the surface layer is high. This soil has a seasonal high water table above the surface or within 1 foot of the surface. Surface water runoff is slow or ponded. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and many are used for unimproved pasture. Some areas are in woodland.

Where drained and protected from flooding, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Diversions and surface drainage ditches are used to prevent flooding and to remove excess surface water more rapidly. Both deep ditches and tile are used for subsurface drainage in this soil. Ditchbanks, however, are easily eroded by flowing water, and vertical banks are likely to cave and plug the ditch. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help prevent scouring by floodwater and maintain good tilth.

Where drained and protected from flooding, this soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover and encourages the growth of undesirable plants. Grazing when the surface layer is wet causes compaction and results in poor tilth. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is poorly suited to trees. Trees grow so slowly and form so poorly that they are barely merchantable at best. Soil wetness generally makes it necessary to plant seedlings by hand or machine on prepared ridges if natural regeneration is unreliable. Use of vigorous nursery stock is essential to avoid seedling mortality. In many years, harvest is limited to periods when the soil is frozen. Harvesting by clear-cut or area-selection methods helps reduce windthrow of the remaining trees. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings because of flooding and ponding. These limitations are difficult to overcome, and a different building site should be selected which is not on a flood plain.

This soil is poorly suited to local roads because of ponding and flooding, and because it does not have sufficient strength to adequately support vehicular traffic. Low strength can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, and by increasing the thickness of pavement. Ponding can be overcome by removing surface water through suitable outlets with culverts and ditches or by using fill material to construct roads above the ponding level. Installing culverts also helps prevent road damage by equalizing the water level on both sides of the road. To overcome flooding, fill material can be used to construct roads above the flood level and stable overflow sections can be constructed by covering a dip in the road with strong concrete and installing riprap on the sides. Installing larger bridges or culverts to permit floodwater to drain away also helps.

This soil is in capability subclass IIw, drained, and woodland suitability subclass 4w.

GaC—Gale silt loam, 6 to 12 percent slopes. This moderately deep, sloping, well drained soil is on narrow ridgetops, short foot slopes, and long back slopes. Individual areas of this map unit are round or irregular in shape and range from about 3 to 70 acres in size.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil is about 26 inches thick. It is dark yellowish brown silt loam in the upper part and dark brown sandy loam in the lower part. The substratum, about 6 inches thick, is light yellowish brown sand. Weakly consolidated sandstone is at a depth of about 39 inches. In some places, loamy strata are in the sandy substratum, and in some places, sandstone is at a depth of more than 40 inches.

Included with this soil in mapping are small areas of Eleva and Meridian soils. Eleva soils are on ridgetops and contain less clay and more sand in the surface layer and subsoil. Meridian soils are on lower toe slopes and are underlain by sand. Also included are some small pits, some cut and filled areas, and some small areas of Gale soils that have slopes of less than 6 percent or more than 12 percent. These inclusions make up from 10 to 15 percent of the map unit.

Permeability is moderate in the subsoil and moderately rapid or rapid in the sandy substratum in this Gale soil. The available water capacity is moderate, and organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting. Depth of rooting for most crops is restricted by the sandstone bedrock.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland or used for unimproved pasture.

This soil is suited to grasses and legumes for hay and to corn, soybeans, and small grains. Where this soil is cultivated, erosion is a moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction, which results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of the depth to rock and the moderately rapid or rapid permeabiity in the sand substratum. This sand readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies. The depth to rock and moderately rapid or rapid permeability can be overcome by constructing a filtering mound of suitable material.

This soil is only moderately suited to dwellings without basements because of the moderate shrink-swell potential in the subsoil and because of slope. Shrinking and swelling of the soil with changes in moisture content can be overcome by excavating the soil and replacing it with a coarse material, such as sand or gravel, or by adding the proper amount of lime to the soil. Slope can be overcome by cutting or cutting and filling. It may also be possible to use included areas of Gale soil that have slope of less than 6 percent.

This soil is only moderately suited to dwellings with basements because of depth to rock, the moderate shrink-swell potential, and slope. Depth to rock can be overcome by excavating the soft sandstone with suitable power equipment, filling the site to raise its level, or by constructing the dwellings with a partly exposed basement to avoid excavating the bedrock. Shrinking and swelling can be overcome by removing the soils around and below the basement excavation and replacing it with a coarse material, such as sand or gravel, and by increasing the strength of the basement walls. Slope can be overcome by cutting or cutting and filling, by using retaining walls to make dwellings conform to the slope, or by constructing dwellings on the existing slope so that the basement floor on one side of the house is at ground level. It may also be possible to use included areas of Gale soil that have slope of less than 6 percent.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of a hazard of frost damage. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or by increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIIe and woodland suitability subclass 2o.

GaD—Gale silt loam, 12 to 20 percent slopes. This moderately deep, moderately steep, well drained soil is on upper side slopes and narrow ridgetops. Individual areas of this map unit are long and narrow and range from about 3 to 25 acres in size.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil is about 24 inches thick. It is dark brown silt loam in the upper part, dark yellowish brown silty clay loam in the middle, and dark yellowish brown loam in the lower part. The substratum, about 6 inches thick, is dark yellowish brown sand. Weakly consolidated sandstone is at a depth of about 34 inches. In some places, loamy strata are in the sandy substratum, and in some places, sandstone is at a depth of more than 40 inches.

Included with this soil in mapping are small areas of Eleva, Downs, and Meridian soils. Eleva soils are on ridgetops and contain less clay and more sand in the surface layer and subsoil. Downs and Meridian soils are on lower valley slopes. Downs soils are moderately well drained and are silty throughout. Meridian soils are underlain by sand. Also included are some small pits,

some cut and filled areas, and some areas of Gale soils that have slopes of less than 12 percent or more than 20 percent. These inclusions make up from 10 to 15 percent of the map unit.

Permeability is moderate in the subsoil and moderately rapid or rapid in the sandy substratum in this Gale soil. The available water capacity is moderate, and organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is rapid. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting. Depth of rooting for most crops is restricted by the sandstone bedrock.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland or are used for unimproved pasture.

This soil is poorly suited to cultivated crops, but it is suited to grasses and legumes for hay. Where this soil is used for cultivated crops, erosion is a severe hazard. Corn, soybeans, and small grains can safely be grown if conservation practices are used. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is suited to pasture. This use is effective in controlling erosion. Overgrazing, however, leads to loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction, which results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. Soil related limitations to forest management are steepness of slope and plant competition following harvest. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival on steeper slopes facing south or west can be improved by care in planting and use of vigorous planting stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable hericides or mechanical removal. Skidding operations may expose sufficient mineral soil to allow adequate regeneration.

This soil is poorly suited to septic tank absorption fields because of depth to rock, the moderately rapid or rapid permeability in the sandy substratum, and slope. The sandy substratum of this soil readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies. The depth to rock and the moderately rapid or rapid permeability can be overcome by constructing a filtering mound of suitable material. Cutting or cutting and filling to reduce the slope can help overcome the slope limitation.

This soil is poorly suited to dwellings without basements because of slope. This limitation can be overcome by cutting or cutting and filling. This soil is poorly suited to dwellings with basements because of slope. This limitation can be overcome by cutting, by cutting and filling, by making dwellings conform to the slope by use of retaining walls, or by constructing dwellings on the existing slope in such a way that the basement floor on one side of the house is at ground level.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic, because of the potential for frost damage, and because of slope. The low strength and potential for frost damage can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage. Slope can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass IVe and woodland suitability subclass 2r.

HpA—Hoopeston sandy loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, somewhat poorly drained soil is on bottom slopes in depressions and along drainageways. Individual areas of this map unit are irregular in shape and range from about 3 to 200 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 10 inches thick. The subsoil is about 14 inches thick. It is brown, mottled sandy loam in the upper part and grayish brown, mottled, loamy sand in the lower part. The substratum to a depth of about 60 inches is light gray, mottled sand. In some places, the surface layer is loam.

Included with this soil in mapping are small areas of Billett, Lows, Meridian, and Shiffer soils. Billett and Meridian soils are on terraces higher than Hoopeston soils. Billett soils formed in similar deposits but are well drained or moderately well drained. Lows soils are poorly drained and are in depressions. They are underlain by sand. Meridian soils are well drained and contain more clay in the subsoil than Hoopeston soils. Shiffer soils are on landscape positions similar to those of Hoopeston soils but contain more clay in the subsoil. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderately rapid and available water capacity is low in this Hoopeston soil. The organic matter content of the surface layer is moderate. This soil has a seasonal high water table at a depth of 1 foot to 3 feet. Surface water runoff is slow. The surface layer is friable and easily tilled throughout a wide range of moisture content.

Drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and some are used as unimproved pasture. Many areas are in woodland.

Where drained, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Surface drainage ditches and land grading are used in some areas to remove excess surface water more rapidly. This soil is suited to sprinkler irrigation. In drained areas that are not irrigated, crop yields are limited by low available water capacity. Because of rapid permeability in the substratum, irrigation rates should be limited to prevent plant nutrients from being washed out of the root zone. Water erosion is generally not a hazard on this soil, but cultivated areas are subject to soil blowing. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, wind stripcropping, and planting field windbreaks and winter cover crops help control soil blowing.

Where drained, this soil is well suited to pasture, but forage yields are generally somewhat limited unless the soil is fertilized and irrigated. Overgrazing leads to a loss of plant cover, resulting in soil blowing and encouraging the growth of undesirable plants. Grazing when the surface layer is wet causes surface compaction and results in poor tilth. Fertilization, liming, renovation, and controlled grazing help to increase yields and maintain plant cover.

This soil is not naturally forested and therefore is not commonly managed for woodland.

This soil is poorly suited to septic tank absorption fields because of wetness and the rapid permeability in the substratum. Wetness can be overcome by constructing a filtering mound of suitable material. It may also be possible to pump the effluent to an absorption field on higher, more suitable soils. During dry periods, or if this soil is drained, the substratum readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies.

This soil is poorly suited to dwellings with or without basements because of wetness. This limitation for dwellings without basements can be overcome by installing a subsurface drainage system that has a gravity outlet or other dependable outlet. For dwellings with basements, wetness can be overcome by constructing the basement above the level of wetness and by installing a subsurface drainage system that has a gravity outlet or other dependable outlet.

This soil is poorly suited to local roads and streets because of a danger of frost damage. This problem can be overcome by using subsurface drainage to drain the roadbed and by replacing the upper part of the soil with a coarse base material, such as sand or gravel.

This soil is in capability subclass IIIw. A woodland suitability subclass is not assigned.

Hu—Houghton muck. This deep, nearly level, very poorly drained soil is in large depressions. It is subject to ponding. Individual areas of this map unit are irregular in shape and range from about 3 to 150 acres in size.

Typically, the organic layer extends to a depth of more than 60 inches (fig. 12). It is very dark brown muck in the upper part, black muck in the middle, and very dark grayish brown muck in the lower part.

Included with this soil in mapping are small areas of Ettrick and Palms soils on similar landscape positions. Palms soils are very poorly drained organic soils that are underlain by silty clay loam. Ettrick soils are silty throughout and are poorly drained. Also included are areas with silty alluvium, 1 foot to 3 feet thick, over organic material. These inclusions make up from 2 to 10 percent of the map unit.

Permeability is moderately rapid in this Houghton soil. The available water capacity and organic matter content are very high. This soil has a seasonal high water table above the surface or within 1 foot of the surface. Surface water runoff is very slow or ponded, but flooding commonly occurs in a few areas of flood plain along streams and rivers.

Most areas of this soil are drained and used for cultivated crops. Undrained areas are in native wetland vegetation and provide wildlife habitat.

Where drained, this soil is suited to cultivated crops, but frost damage to crops is a severe hazard. Because of cold air drainage, there are fewer frost-free days per growing season on this soil than on adjacent upland soils. Both deep ditches and tile are used for subsurface drainage, but some areas do not have suitable outlets. Ditchbanks are easily eroded by flowing water, and vertical banks are likely to cave and plug the ditch. Dikes and diversions are used to control the flooding that commonly occurs in a few flood plain areas along rivers and streams. Drained areas of this soil are subject to burning, and cultivated areas are subject to soil blowing. Excessive lowering of the water table in this soil increases subsidence. Moreover, this soil is compressible, and special wide track equipment is helpful in farming this soil. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, wind stripcropping, and planting field windbreaks and winter cover crops help control soil blowing.

Where drained, this soil is suited to pasture. Undrained areas are poorly suited to pasture, and Reed canarygrass is the only species that grows well on this soil. In drained areas, certain legumes such as red clover can be grown, but the low strength of this soil limits its use for livestock grazing and restricts the use of machinery.

This soil is suited to trees. Soil wetness generally requires planting by hand or machine on prepared ridges if natural regeneration is unreliable. Use of vigorous

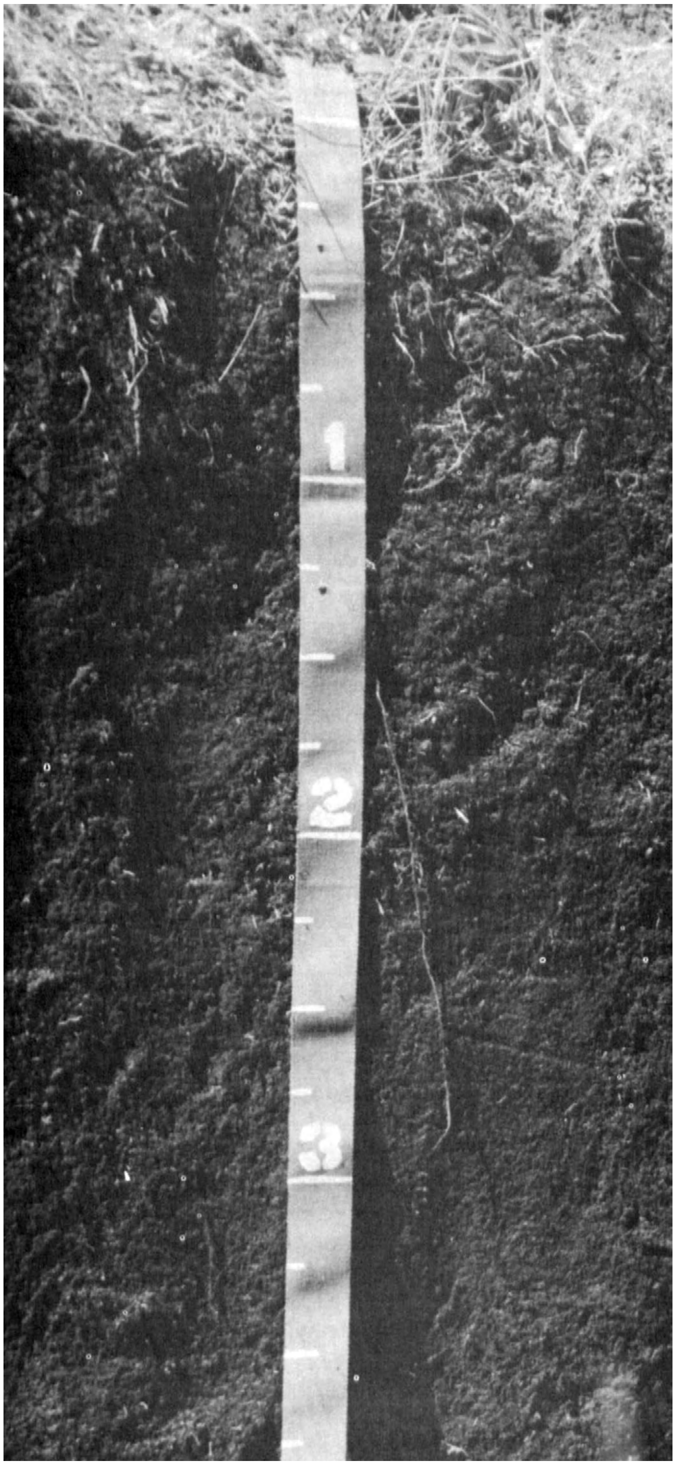


Figure 12.—Profile of Houghton muck. This soil formed in organic material more than 51 inches thick. Measure is in feet.

nursery stock is essential to avoid seedling mortality. In many years, harvest is limited to periods when the soil is frozen. Harvesting by clear-cut or area-selection methods helps reduce windthrow of the remaining trees. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings because of ponding and because the soil does not have sufficient strength to adequately support building foundations. These problems are difficult to overcome, and a different building site should be selected.

This soil is poorly suited to local roads because of ponding, a danger of frost damage, and because it does not have sufficient strength to adequately support vehicular traffic. Low strength and frost damage can be overcome by excavating the organic layers and replacing them with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage. Ponding can be overcome by removing surface water through suitable outlets with culverts and ditches or by using fill material to construct roads above the ponding level. Installing culverts also helps prevent road damage by equalizing the water level on both sides of the road.

This soil is in capability subclass IIIw, drained, and woodland suitability subclass 3w.

ImA—Impact sand, 0 to 2 percent slopes. This deep, nearly level, excessively drained soil is on broad, slightly concave toe slopes and stream terraces. Individual areas of this map unit are irregular in shape and range from about 3 to 250 acres in size.

Typically, the surface layer is very dark grayish brown sand about 8 inches thick. The subsurface layer is dark brown and brown sand about 14 inches thick. The subsoil is yellowish brown sand about 6 inches thick. The substratum to a depth of about 60 inches is brownish yellow sand in the upper part and pale brown sand in the lower part. In some places, strata of sandy loam are in the substratum, and in some places, the slope is greater than 2 percent.

Included with this soil in mapping are small areas of Billett soils. The well drained Billett soils are on similar positions on the landscape but have more clay and less sand in the surface layer and subsoil than Impact soils. Also included are some small pits, some cut and filled areas, and some small areas of silty and loamy colluvium. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is rapid and available water capacity is low in this Impact soil. The organic matter content of the surface layer is moderately low. Surface water runoff is slow. The surface layer is very friable and easily tilled throughout a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Other areas are in woodland. Some areas are used for unimproved pasture.

This soil is poorly suited to corn, soybeans, and small grains and to legumes and grasses for hay. Crop yields

during most seasons are limited by low available water capacity. The soil is suited to sprinkler irrigation, however, and if this soil is irrigated, better and more consistent yields can be expected. Because of the rapid permeability of this soil, irrigation rates should be limited to prevent the washing of plant nutrients out of the root zone. Water erosion is generally not a hazard on this soil, but soil blowing may occur. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, wind stripcropping, and planting field windbreaks and winter cover crops help control soil blowing.

This soil is poorly suited to pasture, but this use is effective in controlling soil blowing. Forage yields are low unless this soil is fertilized, limed, and irrigated. Planting in early spring, before the soil has a chance to dry, is best on this soil. Later plantings have a poor likelihood of survival. Overgrazing leads to a loss of plant cover, resulting in soil blowing. Fertilization, liming, renovation, irrigation, and controlled grazing help to maintain plant cover.

This soil is suited to trees. The rate of seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies.

This soil is suited to dwellings with or without basements and to local roads and streets.

This soil is in capability subclass IVs and woodland suitability subclass 3s.

ImB—Impact sand, 2 to 6 percent slopes. This deep, gently sloping, excessively drained soil is on broad, slightly concave and plane toe slopes and stream terraces. Individual areas of this map unit are irregular in shape and range from about 3 to 1,000 acres in size.

Typically, the surface layer is black sand about 8 inches thick. The subsurface layer is very dark grayish brown and dark brown sand about 7 inches thick. The subsoil is dark yellowish brown sand about 21 inches thick. The substratum to a depth of about 60 inches is very pale brown sand. In some places, the slope is less than 2 percent.

Included with this soil in mapping are small areas of Billett soils. The well drained Billett soils are on similar positions on the landscape, and the moderately well drained Billett soils are on lower positions on the landscape. Billett soils contain more clay and less sand in the surface layer and subsoil than Impact soils. Also included are some areas of Impact soils that have slopes of more than 6 percent. Other inclusions are some small pits, some cut and filled areas, and some small areas of silty or loamy colluvium. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is rapid and available water capacity is low in this Impact soil. The organic matter content of the surface layer is moderately low. Surface water runoff is slow. The surface layer is very friable and easily tilled throughout a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Other areas are in woodland. Some areas are used for unimproved pasture.

This soil is poorly suited to corn, soybeans, and small grains and to legumes and grasses for hay. Crop yields during most seasons are limited by low available water capacity. This soil is suited to sprinkler irrigation, and if this soil is irrigated, better and more consistent yields can be expected. Land leveling, where practicable, allows more even distribution of irrigation water. Because of the rapid permeability of this soil, irrigation rates should be limited to prevent the washing of plant nutrients out of the root zone. Where cultivated, this soil is subject to soil blowing. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, wind stripcropping, and planting field windbreaks and winter cover crops help control soil blowing.

This soil is poorly suited to pasture, but this use is effective in controlling soil blowing. Forage yields are low unless this soil is fertilized, limed, and irrigated. Planting grasses in early spring, before the soil has a chance to dry, is best on this soil. Later plantings have a poor likelihood of survival. Overgrazing leads to a loss of plant cover, resulting in erosion and soil blowing. Fertilization, liming, renovation, irrigation, and controlled grazing help to maintain plant cover.

This soil is suited to trees. The rate of seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil can readily absorb the effluent from septic tanks, but it cannot adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies.

This soil is suited to dwellings with or without basements and to local roads and streets.

This soil is in capability subclass IVs and woodland suitability subclass 3s.

IpA—Impact sand, moderately well drained, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is in slight depressions and along drainageways. Individual areas of this map unit are irregular in shape and range from about 3 to 1,500 acres in size.

Typically, the surface layer is black sand about 4 inches thick. The subsurface layer is very dark brown

sand about 13 inches thick. The subsoil is about 20 inches thick. It is dark yellowish brown sand in the upper part and yellowish brown sand in the lower part. The substratum to a depth of about 60 inches is mottled, multicolored sand in the upper part and grayish brown sand in the lower part. In some places, the surface layer is loamy sand.

Included with this soil in mapping are small areas of somewhat poorly drained Au Gres and Meehan soils in depressions and small areas of silty and loamy colluvium. These inclusions make up from 3 to 6 percent of the map unit.

Permeability is rapid and available water capacity is low in this Impact soil. The organic matter content of the surface layer is moderately low. This soil has a seasonal high water table at a depth of 3 to 6 feet. Surface water runoff is slow. The surface layer is very friable and easily tilled throughout a wide range in moisture content.

Most areas of this soil are in woodland. Some areas are used for cultivated crops, hay, and pasture. Other areas are used for unimproved pasture.

This soil is poorly suited to corn, soybeans, and small grains and to legumes and grasses for hay. Crop yields during most seasons are limited by low available water capacity. This soil is, however, suited to sprinkler irrigation, and if the soil is irrigated, better and more consistent yields can be expected. Because of the rapid permeability of this soil, irrigation rates should be limited to prevent the washing of plant nutrients out of the root zone. Water erosion is generally not a hazard on this soil, but soil blowing may occur. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, wind stripcropping, and planting field windbreaks and winter cover crops help control soil blowing.

This soil is poorly suited to pasture, but this use is effective in controlling soil blowing. Forage yields are low unless this soil is fertilized, limed, and irrigated. Planting in early spring, before the soil has a chance to dry, is best on this soil. Later plantings have a poor likelihood of survival. Overgrazing leads to a loss of plant cover and results in soil blowing. Fertilization, liming, renovation, irrigation, and controlled grazing help to maintain plant cover.

This soil is suited to trees. The rate of seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of wetness and rapid permeability. It readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies. Wetness and rapid permeability can be overcome by constructing a filtering mound of suitable material. It may also be possible to pump the effluent to an absorption field on higher, more suitable soils.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements. For dwellings with basements, the main limitation is wetness, which can be overcome by constructing the basement above the level of wetness or by installing a subsurface drainage system that has a gravity outlet or some other dependable outlet.

This soil is suited to local roads and streets.

This soil is in capability subclass IVs and woodland suitability subclass 3s.

JaA—Jackson silt loam, 0 to 2 percent slopes. This deep, nearly level, moderately well drained soil is in slight depressions and along drainageways. Individual areas of this map unit are irregular in shape and range from about 3 to 30 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 35 inches thick. It is dark yellowish brown silt loam in the upper part, yellowish brown, mottled silt loam in the middle, and stratified brown silt loam and yellowish brown, mottled sandy loam in the lower part. The substratum to a depth of about 60 inches is brownish yellow sand. In some places, the substratum is silt loam or the slope is slightly more than 2 percent.

Included with this soil in mapping are small areas of Bertrand, Curran, and Dells soils. The well drained Bertrand soils formed in similar deposits but are on higher stream terraces. Curran and Dells soils formed in similar deposits but are somewhat poorly drained and are on lower stream terraces. Also included are some areas that have sand at a depth of less than 40 inches. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Jackson soil. The available water capacity is high, and organic matter content of the surface layer is moderate. This soil has a seasonal high water table at a depth of 2.5 to 6 feet. Surface water runoff from cultivated areas is medium. The surface layer is friable, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are in woodland.

This soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Erosion is generally not a problem on this soil. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help maintain good tilth. If well managed, this soil can be cropped intensively.

This soil is well suited to pasture. Overgrazing, however, leads to loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants.

Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of wetness. This limitation can be overcome by constructing a filtering mound of suitable material or pumping the effluent to an absorption field located on higher suitable soils.

This soil is only moderately suited to dwellings with or without basements. For dwellings without basements, the main limitation is the moderate shrink-swell potential in the subsoil. Shrinking and swelling of the soil with changes in moisture can be overcome by excavating the soil and replacing it with coarse material such as sand or gravel. For dwellings with basements, the main limitations are wetness and shrink-swell in the subsoil. Wetness can be overcome by constructing the basement above the level of wetness and by installing a subsurface drainage system that has a gravity outlet or other dependable outlet. Shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material such as sand or gravel. It can also be overcome by increasing the strength of basement walls and installing a subsurface drainage system around the dwelling at or below the basement elevation.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of a danger of frost damage. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability class I and woodland suitability subclass 1o.

JaB—Jackson silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on slightly concave and plane toe slopes. Individual areas of this map unit are irregular in shape and range from about 3 to 100 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is about 36 inches thick. It is dark yellowish brown silt loam in the upper part and dark yellowish brown, mottled sandy loam in the lower part. The substratum to a depth of about 60 inches is brownish yellow sand. In some places, the lower part of the subsoil and the substratum are silt loam or the slope is slightly less than 2 percent.

Included with this soil in mapping are small areas of Bertrand, Curran, and Dells soils. The well drained Bertrand soils formed in similar deposits but are on higher stream terraces and valley slopes. Curran and Dells soils formed in similar deposits but are somewhat poorly drained and are on lower stream terraces. Also included are some areas that have sand at a depth of less than 40 inches. Other inclusions are some areas of Jackson soils that have slopes of more than 6 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Jackson soil. The available water capacity is high, and the organic matter content of the surface layer is moderate. This soil has a seasonal high water table at a depth of 2.5 to 6 feet. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are in woodland.

This soil is well suited to corn, soybeans, and small grains, and to legumes and grasses for hay. Where this soil is cultivated, water erosion is a slight or moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting field windbreaks and winter cover crops, and constructing grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of wetness. This limitation can be overcome by constructing a filtering mound of suitable material or pumping the effluent to an absorption field on higher, more suitable soils.

This soil is only moderately suited to dwellings with or without basements. For dwellings without basements, the main limitation is the moderate shrink-swell potential in the subsoil. Shrinking and swelling of the soil with changes in moisture content can be overcome by

excavating the soil and replacing it with coarse material, such as sand or gravel. For dwellings with basements, the limitations are wetness and shrink-swell potential in the subsoil. Wetness can be overcome by constructing the basement above the level of wetness and installing a subsurface drainage system that has a gravity outlet or other dependable outlet. Shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material, such as sand or gravel. It can also be overcome by increasing the strength of basement walls and installing a subsurface drainage system around the dwelling at or below the basement elevation.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of a danger of frost damage. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability class IIe and woodland suitability subclass 1o.

Ka—Kato silt loam. This deep, nearly level, poorly drained soil is on flood plains of major streams. It is subject to frequent flooding and to ponding. Individual areas of this map unit are long and narrow or irregular in shape and range from about 3 to 135 acres in size.

Typically, the surface layer is very dark gray silt loam about 14 inches thick. The subsoil is about 22 inches thick. It is grayish brown, mottled silt loam in the upper part, gray, mottled silt loam in the middle, and olive gray, mottled silt loam in the lower part. The substratum to a depth of about 60 inches is olive gray, mottled sand. In some places, the substratum is silt loam.

Included with this soil in mapping are small areas of Curran, Dawson, and Dells soils. The somewhat poorly drained Curran and Dells soils formed in similar deposits but are on higher stream terraces. The very poorly drained Dawson soils are on lake basins and flood plains. They formed in muck over sand. These inclusions make up from 2 to 10 percent of the map unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Kato soil. The available water capacity is moderate, and organic matter content of the surface layer is high. This soil has a seasonal high water table above the surface or within 1 foot of the surface. Surface water runoff is slow or ponded. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are undrained and are used for unimproved pasture or are left idle to provide wildlife habitat. A few are in woodland. A few drained areas of this soil are used for cultivated crops, hay, and pasture.

Where drained and protected from flooding, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Dikes, diversions, surface drainage ditches, and land grading are used to prevent flooding and to remove excess surface water rapidly. Both deep ditches and tile are used for subsurface drainage. However, in areas where tile is placed in the underlying sand deposits, precautions should be taken to prevent loose sand from entering the tile lines. Such precautions include placing filter material, such as topsoil, straw, hay, coarse sand-gravel mixtures, or artificial fiber wrapping, over the tile. Ditchbanks are easily eroded by flowing water, and vertical banks are likely to cave and plug the ditch. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help prevent scouring by floodwater and maintain good tilth.

Where drained and protected from flooding, this soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover and encourages the growth of undesirable plants. Grazing when the surface layer is wet causes surface compaction and results in poor tilth. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is not naturally forested and therefore is not commonly managed for woodland.

This soil is generally unsuited to septic tank absorption fields and dwellings with or without basements because of flooding and ponding. These problems are difficult to overcome, and a building site that is not on a flood plain should be selected.

This soil is poorly suited to local roads because of ponding and flooding, and because it does not have sufficient strength to adequately support vehicular traffic. Low strength can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or by increasing the thickness of pavement. Ponding can be overcome by removing surface water through suitable outlets with culverts and ditches or by using fill material to construct roads above the ponding level. Installing culverts also helps prevent road damage by equalizing the water level on both sides of the road. To overcome flooding, fill material can be used to construct roads above the flood level and stable overflow sections can be constructed by covering a dip in the road with strong concrete and installing riprap on the sides. Installing larger bridges or culverts to permit the floodwater to drain away also helps.

This soil is in capability subclass IIw, drained. A woodland suitability subclass is not assigned.

KpA—Kickapoo fine sandy loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is on flood plains mostly near head slopes. It is subject to occasional flooding. Individual areas of this map unit are long and narrow and range from about 5 to 225 acres in size.

Typically, the surface layer is very dark grayish brown fine sandy loam about 5 inches thick. The upper 21 inches of the substratum is dark brown fine sandy loam over dark brown, mottled loam. The next 10 inches, a buried layer, is black fine sandy loam. The lower part of the substratum to a depth of about 60 inches is dark brown, mottled fine sandy loam. In some places, the surface layer is silt loam, loam, or loamy fine sand. In some places, strata of pebbles or cobbles are in the lower part of the substratum, and in some places, the slope is slightly more than 3 percent.

Included with this soil in mapping are small areas of Ceresco and Council soils. Ceresco soils formed in similar deposits but are somewhat poorly drained and are on lower positions on flood plains. Council soils contain more clay than Kickapoo soils, are well drained, and are on higher positions on foot slopes. These inclusions make up from 10 to 15 percent of the map unit.

Permeability, available water capacity, and organic matter content of the surface layer all are moderate in this Kickapoo soil. This soil has a seasonal high water table at a depth of 3 to 6 feet. Surface water runoff is slow. The surface layer is very friable and easily tilled throughout a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Many other areas are used for unimproved pasture or are in native vegetation.

This soil is well suited to corn, soybeans, small grains, and tobacco and to grasses and legumes for hay. Surface drainage ditches help remove excess surface water more rapidly. In a few areas, dikes and diversions can be used to prevent flooding. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help to prevent scouring by floodwater and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction, which results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and to dwellings with or without basements because of flooding or wetness. These limitations are difficult to overcome, and a building site that is not on a flood plain should be selected.

This soil is poorly suited to local roads because of flooding. To overcome flooding, fill material can be used to construct roads above the flood level and stable overflow sections can be constructed by covering a dip in the road with strong concrete cover and installing riprap on the sides. Installing larger bridges or culverts to permit the floodwater to drain away also helps.

This soil is in capability subclass IIIw and woodland suitability subclass 3o.

LfC2—La Farge silt loam, 4 to 12 percent slopes, eroded. This moderately deep, gently sloping and sloping, well drained soil is on narrow, convex ridgetops. Individual areas of this map unit are long and narrow and range from about 4 to 20 acres in size.

In most cultivated areas, most of the original surface layer has been removed by erosion. Typically, the present surface layer is mostly dark grayish brown silt loam about 8 inches thick that includes some dark yellowish brown or grayish brown silt loam. The subsoil is about 28 inches thick. It is dark yellowish brown silt loam in the upper part and dark brown silt loam in the lower part. Weakly consolidated, fine-grained sandstone is at a depth of about 36 inches. In some places, sandstone is at a depth ranging from 50 to 60 inches, and in some places, the slope is slightly less than 4 percent.

Included with this soil in mapping are small areas of Council, Downs, and Urne soils. Council soils are on valley slopes. Downs soils are moderately well drained and are on high stream terraces and valley slopes. Both Council and Downs soils have a loamy substratum and do not have the underlying sandstone in La Farge soils. Urne soils are on adjacent ridgetops and valley slopes. They contain less clay in the subsoil than La Farge soils. Also included are some areas of La Farge soils on crests and convex slopes that are severely eroded and in which the surface layer is dark yellowish brown silt loam or silty clay loam. Other inclusions are some small pits, some cut and filled areas, and some areas of La Farge soils that have slopes of more than 12 percent. Also included are some areas of soils that have a mottled subsoil underlain by sandstone. These inclusions make up from 5 to 15 percent of the map unit.

Permeability and available water capacity are moderate in this La Farge soil. The organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled over a fairly wide range in moisture content. Depth of rooting for most cultivated crops is restricted by sandstone bedrock.

Most areas of this soil are used for cultivated crops, hay, and pasture. Many other areas are in woodland. Some areas are used for unimproved pasture.

This soil is suited to grasses and legumes for hay and to corn, soybeans, and small grains. Where this soil is used for cultivated crops, further erosion is a moderate

hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the surface, contour farming, contour stripcropping, planting winter cover crops, and constructing grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to loss of plant cover, resulting in further erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of depth to rock. This limitation can be overcome by constructing a filtering mound of suitable material.

This soil is only moderately suited to dwellings without basements because of the moderate shrink-swell potential in the subsoil and slope in areas where it exceeds 6 percent. Shrinking and swelling of the soil with changes in moisture content can be overcome by excavating the soil and replacing it by a coarse material, such as sand or gravel, or by adding the proper amount of lime to the soil. Slope can be overcome by cutting, by cutting or filling, or, where possible, by using areas of La Farge soils in areas where the slope is less than 6 percent.

This soil is only moderately suited to dwellings with basements because of depth to rock, the moderate shrink-swell potential, and slope in areas where it exceeds 6 percent. Depth to rock can be overcome by excavating the soft sandstone with suitable power equipment, by filling to raise the site elevation, or by constructing the dwelling with a partly exposed basement to avoid excavating the sandstone. Shrinking and swelling can be overcome by removing the soil around the basement excavation and replacing it with a coarse material, such as sand or gravel. It can also be overcome by increasing the strength of the basement walls. Slope can be overcome by cutting, by cutting and filling, by making dwellings conform to the slope by the use of retaining walls, or by constructing dwellings on the existing slope so that the basement floor on one side of the house is at ground level. Dwellings can be constructed in areas of Gale soil where the slope is less than 6 percent to avoid the limitation of slope.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of a danger of frost damage. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIIe and woodland suitability subclass 2o.

LfD2—La Farge silt loam, 12 to 20 percent slopes, eroded. This moderately deep, moderately steep, well drained soil is on narrow ridgetops and upper side slopes. Individual areas of this map unit are long and narrow and range from about 4 to 300 acres in size.

In most cultivated areas, some of the original surface layer has been removed by erosion. The present cultivated surface layer is mostly dark grayish brown silt loam about 8 inches thick that includes some yellowish brown silt loam. The subsoil is about 23 inches thick. It is yellowish brown silt loam in the upper part and olive brown fine sandy loam in the lower part. Weakly consolidated, fine-grained sandstone is at a depth of about 31 inches. In some places, sandstone is at a depth ranging from 50 to 60 inches.

Included with this soil in mapping are small areas of Council, Downs, and Urne soils. Council soils are on valley slopes. Downs soils are moderately well drained and are on valley slopes. Both Council and Downs soils have a loamy substratum and do not have the underlying sandstone. Urne soils are on ridgetops and valley slopes and contain less clay in the subsoil than La Farge soils. Also included are some areas of La Farge soils on convex slopes that are severely eroded and have a surface layer of silty clay loam. Also included are some small pits, some cut and filled areas, and some small areas of La Farge soils that have slopes of less than 12 percent or more than 20 percent. Other inclusions are small areas of soils with mottled subsoils that are underlain by sandstone. These inclusions make up from 10 to 15 percent of the map unit.

Permeability and available water capacity are moderate in this La Farge soil. The organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is rapid. The surface layer is friable and easily tilled over a fairly wide range in moisture content. Depth of rooting for most cultivated crops is restricted by sandstone bedrock.

Most areas of this soil are used for cultivated crops, hay, and pasture. Many areas are in woodland, and other areas are used for unimproved pasture.

This soil is poorly suited to cultivated crops, but it is suited to grasses and legumes for hay. Where this soil is used for cultivated crops, further erosion is a severe hazard. Corn, soybeans, and small grains can safely be grown if conservation practices are used. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface,

contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. This use is effective in controlling erosion. Overgrazing, however, leads to a loss of plant cover, resulting in further erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. Soil related limitations to forest management are steepness of slope and plant competition following harvest. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival on steeper slopes facing south or west can be improved by care in planting and use of vigorous planting stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal. Skidding operations may expose sufficient mineral soil to allow adequate regeneration.

This soil is poorly suited to septic tank absorption fields because of depth to rock and slope. Depth to rock can be overcome by constructing a filtering mound of suitable material. Reducing the slope by cutting or by cutting and filling can help to overcome the problem of slope.

This soil is poorly suited to dwellings without basements because of slope. This limitation can be overcome by cutting or by cutting and filling.

This soil is poorly suited to dwellings with basements because of slope. This limitation can be overcome by cutting, by cutting and filling, by making dwellings conform to the slope by use of retaining walls, or by constructing dwellings on the existing slope in such a way that the basement floor on one side of the house is at ground level.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic, because of a danger of frost damage, and because of slope. The low strength and potential for frost damage can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of the pavement and by providing good surface and subsurface drainage. Slope can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass IVe and woodland suitability subclass 2r.

Lw—Lows sandy loam. This deep, nearly level, poorly drained soil is in slight depressions on flood plains and low stream terraces. It is subject to occasional flooding and to ponding. Individual areas of this map unit are irregular in shape and range from about 3 to 110 acres in size.

Typically, the surface layer is very dark grayish brown, mottled sandy loam about 8 inches thick. The subsurface layer is grayish brown, mottled sandy loam about 3 inches thick. The subsoil is about 19 inches thick. It is light brownish gray, mottled loam in the upper part and light brownish gray, mottled sandy loam in the lower part. The substratum to a depth of about 60 inches is grayish brown, mottled sand. In some places, the surface layer is loam or muck. In some places, strata of clay loam or clay are in the substratum.

Included with this soil in mapping are small areas of Dells, Hoopeston, Newson, and Shiffer soils. Dells, Hoopeston, and Shiffer soils are somewhat poorly drained and are on slightly higher stream terraces. Newson soils are on similar positions on the landscape but are sandy throughout. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Lows soil. Available water capacity is moderate. The organic matter content of the surface layer is moderate or high. This soil has a seasonal high water table above the surface or within 1 foot of the surface. Surface water runoff is very slow or ponded. The surface layer is very friable and easily tilled throughout a wide range in moisture content.

Most areas of this soil are in native vegetation. Many of these areas are used for unimproved pasture. A few areas are drained and are used for cultivated crops, hay, or pasture.

Where drained, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Diversions and surface drainage ditches are used to prevent flooding and to remove excess surface water more rapidly. Both deep ditches and tile are used for subsurface drainage in this soil. However, where tile are placed in the underlying sand deposits, precautions are needed to prevent loose sand from entering the tile lines. Such precautions include placing filter material, such as topsoil, straw, hay, coarse sand-gravel mixtures, or artificial fiber wrapping, over the tile. Ditchbanks are easily eroded by flowing water, and vertical banks are likely to cave and plug the ditch. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help prevent scouring by floodwater and maintain good tilth.

Where drained, this soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover and encourages the growth of undesirable plants. Grazing when the surface layer is wet causes compaction and results in poor tilth. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet

periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. Soil wetness generally requires planting by hand or machine on prepared ridges if natural regeneration is unreliable. Use of vigorous nursery stock is essential to avoid seedling mortality. In many years, harvest is limited to periods when the soil is frozen. Harvesting by clear-cut or area-selection methods helps reduce windthrow of the remaining trees. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings with or without basements because of flooding and ponding. These limitations are difficult to overcome, and a building site should be selected which is not on a flood plain.

This soil is poorly suited to local roads because of ponding, flooding, and a danger of frost damage. Frost damage can be overcome by draining the roadbed by subsurface drainage and by replacing the upper part of the soil with a coarse base material, such as sand or gravel. Ponding can be overcome by removing surface water through suitable outlets with culverts and ditches or by using fill material to construct roads above the ponding level. Installing culverts also helps prevent road damage by equalizing the water level on both sides of the road. To overcome flooding, fill material can be used to construct roads above the flood level and stable overflow sections can be constructed by covering a dip in the road with strong concrete and installing riprap on the sides. Installing larger bridges or culverts to permit the floodwater to drain away also helps.

This soil is in capability subclass IIw, drained, and woodland suitability subclass 3w.

Lx—Loxley mucky peat. This deep, nearly level, very poorly drained soil is in broad depressions, drainageways, and flood plains. It is subject to ponding. Individual areas of this map unit are irregular in shape and range from about 3 to 400 acres in size.

Typically, the organic material extends to a depth greater than 60 inches. It is dark reddish brown mucky peat about 14 inches thick in the upper part and dark reddish brown muck in the lower part.

Included with this soil in mapping are small areas of Dawson and Newson soils. Dawson soils are on similar positions on the landscape as Loxley soils but have sand under the organic layers. Newson soils are poorly drained and are on slightly higher positions on the landscape. They are sandy throughout. Also included are some areas that have up to 6 inches of sphagnum moss on the surface and some areas of silty alluvium, 1 foot to 3 feet thick over organic material. These inclusions make up from 2 to 10 percent of the map unit.

Permeability is moderately rapid in this Loxley soil. The available water capacity and organic matter content are very high. This soil has a seasonal high water table at the surface or within 1 foot of the surface. Surface water runoff is very slow or ponded. In a few areas, mostly narrow flood plains, this soil is commonly subject to flooding.

Most areas of this soil are in native wetland vegetation. Sphagnum moss is harvested in a few areas.

This soil is generally unsuited to cultivated crops. The soil is wet and extremely acid, and there is a severe hazard of frost damage to crops. Because of cold air drainage, there are fewer frost-free days per growing season on this soil than on adjacent upland soils.

This soil is poorly suited to pasture because it is wet for long periods.

This soil is not suited to woodland because it does not support trees of merchantable size and quality. Good land use may include management of woody cover for recreation use or wildlife habitat.

This soil is generally unsuited to septic tank absorption fields and dwellings because of ponding and because it does not have sufficient strength to adequately support building foundations. These limitations are difficult to overcome, and a different building site should be selected.

This soil is poorly suited to local roads because it does not have sufficient strength to adequately support vehicular traffic, because of a danger of frost damage, and because of ponding. Low strength and frost damage can be overcome by excavating the organic material and replacing it with coarse base material, such as sand or gravel, and by increasing the thickness of the pavement. Ponding can be overcome by removing surface water through suitable outlets with culverts and ditches or by using fill material to construct roads above the ponding level. Installing culverts also helps prevent road damage by equalizing the water level on both sides of the road.

This soil is in capability subclass VIw, undrained. A woodland suitability subclass is not assigned.

MaA—Meehan and Au Gres sands, 0 to 3 percent slopes. This map unit consists of areas of deep, nearly level and gently sloping, somewhat poorly drained soils along drainageways and in slight depressions. Individual areas of this map unit are irregular in shape and range from about 3 to 400 acres in size. The pattern and proportion of the Meehan and Au Gres soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of both of them. These soils are similar enough in morphology and behavior characteristics that mapping them separately is not important for the objectives of the survey.

Typically, the Meehan soil has a surface layer of very dark gray and grayish brown sand about 9 inches thick. The subsoil is about 18 inches thick. It is brown, mottled sand in the upper part and pale brown, mottled sand in the lower part. The substratum to a depth of about 60 inches is light gray, mottled sand.

Typically, the Au Gres soil has a surface layer of black sand about 4 inches thick which is covered with about 1 inch of leaf litter. The subsurface layer is dark grayish brown, mottled sand about 12 inches thick. The subsoil is about 10 inches thick. It is dark reddish brown sand in the upper part and strong brown, mottled sand in the lower part. The substratum to a depth of about 60 inches is light yellowish brown, mottled sand in the upper part and light gray, mottled sand in the lower part.

Included with these soils in mapping are small areas of Dawson, Hoopeston, Lows, Newson, and Wyeville soils. Dawson soils are very poorly drained organic soils. Lows soils are poorly drained and are underlain by sand. Newson soils are poorly drained and are sandy throughout. Dawson, Lows, and Newson soils are in depressions and along drainageways. Hoopeston soils are somewhat poorly drained and are in depressions and along drainageways. They have a surface layer and subsoil of sandy loam. Wyeville soils are somewhat poorly drained and are in lake basins. They have a sandy mantle over clayey deposits. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is rapid in the Meehan and Au Gres soils. The available water capacity is low, and organic matter content of the surface layer is moderately low in these soils. The Meehan soil has a seasonal high water table at a depth of 1.5 foot to 3.0 feet. The Au Gres soil has a seasonal high water table at a depth of 1 foot to 2 feet. Surface water runoff is slow. The surface layer of these soils is very friable and easily tilled throughout a wide range in moisture content.

Most areas of these soils are in woodland. Some areas are used for cultivated crops, hay, and pasture. Other areas are used for unimproved pasture.

These soils are poorly suited to cultivated crops because of wetness. Where drained and irrigated, these soils are suited to corn, soybeans, and small grains and to legumes and grasses for hay. Surface drainage ditches are used to remove excess surface water more rapidly. Deep ditches and tile drainage are used for subsurface drainage. Where tile is used, precautions are needed to prevent loose sand from entering the tile line. Such precautions include placing filter material, such as topsoil, straw, hay, coarse sand-gravel mixtures, or artificial fabric wrapping, over the tile. Ditchbanks are easily eroded by flowing water, and vertical banks are likely to cave and plug the ditch.

Drained and cultivated areas of these soils are subject to soil blowing. Where the water table is lowered excessively, crop yields during most seasons are limited by low available water capacity. Where drained, these soils are suited to sprinkler irrigation. If undrained areas of these soils are cultivated, tillage and harvesting are occasionally delayed by wetness. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, wind stripcropping, and planting field windbreaks and winter cover crops help control soil blowing.

These soils are poorly suited to pasture because they are saturated near the surface for long periods and have a low available water capacity.

These soils are suited to trees. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

These soils are poorly suited to septic tank absorption fields because of wetness and rapid permeability. Wetness can be overcome by building a filtering mound of suitable material. It may also be possible to pump the effluent to an absorption field on higher, more suitable soils.

These soils are poorly suited to dwellings with or without basements because of wetness. For dwellings without basements, wetness can be overcome by installing a subsurface drainage system that has a gravity outlet or other dependable outlet or by filling the site to raise its level. For dwellings with basements, wetness can be overcome by constructing the basement above the level of wetness or by installing a subsurface drainage system that has a gravity outlet or other dependable outlet.

These soils are only moderately suited to local roads and streets because of wetness and a danger of frost damage. Wetness can be overcome by using fill material to raise the roadbed above the level of wetness or by installing a subsurface drainage system to lower the seasonal water table. Frost damage can be overcome by using subsurface drainage to drain the roadbed and replacing the upper part of the soil with a coarse base material, such as sand or gravel.

These soils are in capability subclass IVw and woodland suitability subclass 3s.

Mb—Menasha silty clay loam. This deep, nearly level, poorly drained soil is in depressions and drainageways. It is subject to occasional flooding and to ponding. Individual areas of this map unit are irregular in shape and range from about 40 to 75 acres in size.

Typically, the surface layer is black silty clay loam about 8 inches thick. The subsoil is about 21 inches thick. It is very dark gray, mottled clay in the upper part; gray, mottled clay in the middle; and reddish brown, mottled clay in the lower part. The substratum to a depth of about 60 inches is reddish brown and reddish gray, mottled clay. In some places, the surface layer is silt loam or loam.

Included with this soil in mapping are small areas of Wautoma and Wyeville soils. Wautoma soils are poorly drained and are on landscape positions similar to those of Menasha soils. Wyeville soils are somewhat poorly drained and are on slightly higher positions on the landscape. Both Wautoma and Wyeville soils have a

sandy mantle over clayey deposits. Also included are soils that formed in similar deposits but are somewhat poorly drained and are on slightly higher positions on the landscape. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is slow or very slow, and available water capacity is moderate in this Menasha soil. The organic matter content of the surface layer is moderately low or moderate. This soil has a seasonal high water table above the surface or within 1 foot of the surface. Surface water runoff is very slow or ponded. The surface layer is friable but is not easily tilled because of the high clay content. Tilling when the soil is too moist causes compaction, clodding, and crusting.

Many areas of this soil are used for cultivated crops, hay, and pasture. Other areas are used for unimproved pasture or are in native wetland vegetation.

Where drained, this soil is well suited to corn and small grains and to legumes and grasses for hay. There is, however, a hazard of frost damage to crops in late spring and early fall. Surface drainage ditches and land grading are used to remove surface water more rapidly. Proper management of crop residue and the use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help to maintain good tilth.

Where drained, this soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, encouraging the growth of undesirable plants. Grazing when the surface layer is wet causes surface compaction and results in poor tilth. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. Soil wetness generally requires planting by hand or machine on prepared ridges if natural regeneration is unreliable. Use of vigorous nursery stock is essential to avoid seedling mortality. In many years, harvest is limited to periods when the soil is frozen. Harvesting by clear-cut or area-selection methods helps reduce windthrow of the remaining trees. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings because of ponding, slow or very slow permeability, and a high shrink-swell potential. These problems are difficult to overcome, and a different building site should be selected.

This soil is poorly suited to local roads because it does not have sufficient strength to adequately support vehicular traffic and because of ponding. Low strength can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, and increasing the thickness of pavement. Ponding can be overcome by removing surface water through suitable outlets with culverts and ditches or by using fill material to construct roads above the level of ponding. Installing culverts also helps prevent road damage by equalizing the water level on both sides of the road.

This soil is in capability subclass IIw, drained, and woodland suitability subclass 2w.

MdA—Meridian loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on broad, slightly concave toe slopes and stream terraces. Individual areas of this map unit are irregular in shape and range from about 3 to 170 acres in size.

Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsoil is about 24 inches thick. It is dark yellowish brown loam in the upper part and yellowish brown sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown and light brown sand. In some places, the slope is slightly more than 2 percent. In some places, chert pebbles are in the subsoil and substratum, and in places, loamy strata are in the substratum.

Included with this soil in mapping are small areas of Billett and Shiffer soils. Billett soils are well drained or moderately well drained and are on similar positions on the landscape. Billett soils contain less clay in the upper part of the subsoil than Meridian soils. Shiffer soils formed in similar deposits but are somewhat poorly drained and are on lower positions on the landscape. Also included are some areas of soils that are similar to Meridian but are moderately well drained, some small pits, and some cut and filled areas. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Meridian soil. The available water capacity and organic matter content of the surface layer are moderate. Surface water runoff from cultivated areas is slow. The surface layer is friable and easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Other areas are in woodland.

This soil is well suited to corn, soybeans, and small grains and to grasses and legumes for hay. It has a moderate drought hazard. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following

harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies.

This soil is suited to dwellings with or without basements.

This soil is only moderately suited to local roads and streets because of a danger of frost damage. This problem can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel.

This soil is in capability subclass IIs and woodland suitability subclass 2o.

MdB—Meridian loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on broad toe slopes and stream terraces. Individual areas of this map unit are irregular in shape and range from about 3 to 100 acres in size.

Typically, the surface layer is very dark brown loam about 7 inches thick. The subsoil is about 19 inches thick. It is dark brown and dark yellowish brown loam in the upper part and yellowish brown sandy loam in the lower part. The substratum to a depth of about 60 inches is brownish yellow sand. In some places, the slope is slightly less than 2 percent. Also, in some places, chert pebbles are in the subsoil and substratum, and in places loamy strata are in the substratum.

Included with this soil in mapping are small areas of Billett, Eleva, and Shiffer soils. Billett soils are well drained or moderately well drained and are on similar positions on the landscape. Billett soils contain less clay in the upper part of the subsoil than Meridian soils. Eleva soils are underlain by sandstone and are generally on back slopes. Shiffer soils formed in similar deposits, but are somewhat poorly drained and are on lower terraces and along drainageways. Also included are some small pits, some cut and filled areas, some small areas of Meridian soils that have slopes of more than 6 percent, and some soils that are similar to Meridian soils but are moderately well drained. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Meridian soil. The available water capacity and organic matter content of the surface layer are moderate. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland.

This soil is well suited to corn, soybeans, and small grains and to grasses and legumes for hay. It has a moderate drought hazard. Where this soil is cultivated, erosion is a slight or moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies.

This soil is suited to dwellings with or without basements.

This soil is only moderately suited to local roads and streets because of a danger of frost damage. This problem can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel.

This soil is in capability subclass IIe and woodland suitability subclass 2o.

Ne—Newson loamy sand. This deep, nearly level, poorly drained soil is along drainageways and in depressions. It is subject to occasional flooding. Individual areas of this map unit are long and narrow or irregular in shape and range from about 3 to 1,000 acres in size.

Typically, the surface layer is black loamy sand about 6 inches thick which is covered by about 2 inches of black muck. The subsoil is about 19 inches thick. It is dark gray, mottled loamy sand in the upper part and grayish brown, mottled loamy sand in the lower part. The substratum to a depth of about 60 inches is very pale brown, mottled sand. In some places, the muck surface layer is up to 16 inches thick, and in other places, the surface layer is sand, mucky sand, or mucky loamy sand. In some places, the subsoil is a dark reddish brown weakly consolidated sand. In a few places, clayey or loamy strata are in the substratum.

Included with this soil in mapping are small areas of Au Gres, Dawson, Lows, and Meehan soils. Au Gres and Meehan soils are somewhat poorly drained and are on higher positions on the landscape. These soils developed in sandy deposits similar to those in which Newson soils formed. Dawson soils are very poorly

drained and are on lower positions on the landscape. They formed in muck over sand. Lows soils are poorly drained and are on similar landscape positions. They have a loamy surface layer and subsoil underlain by sand. Also included are some areas of silty or loamy alluvium 1 foot to 3 feet thick over sand. These inclusions make up from 2 to 10 percent of the map unit.

Permeability is rapid and available water capacity is low in this Newson soil. The organic matter content of the surface layer is high or very high. This soil has a seasonal high water table at the surface or within one foot of the surface. Surface water runoff is very slow. The surface layer is very friable and easily tilled over a wide range in moisture content.

Most areas of this soil are in woodland. Some areas are used for unimproved pasture. A few drained areas are used for cultivated crops, hay, and pasture.

This soil is generally unsuited to cultivated crops. It is subject to occasional flooding and is wet. In areas of this soil, frost damage to crops is a severe hazard. Because of cold air drainage, there are fewer frost-free days per growing season on this soil than on adjacent upland soils. Drained and cultivated areas of this soil are subject to soil blowing. Also, in areas where the water table is lowered excessively, crop yields during most seasons are limited by low available water capacity.

This soil is poorly suited to pasture because it is saturated near the surface for long periods and has low available water capacity.

This soil is poorly suited to trees. Trees grow so slowly and form so poorly that they are barely merchantable at best. Soil wetness generally requires planting seedlings by hand or machine on prepared ridges if natural regeneration is unreliable. Use of vigorous nursery stock is essential to avoid seedling mortality. In many years, harvest is limited to periods when the soil is frozen. Harvesting by clear-cut or area-selection methods helps reduce windthrow of remaining trees. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings because of flooding, wetness, and rapid permeability. These problems are difficult to overcome, and a different building site should be selected.

This soil is poorly suited to local roads because of wetness and flooding. Wetness can be overcome by using fill material to raise the roadbed above the level of wetness or by installing a subsurface drainage system to lower the seasonal water table. To overcome flooding, fill material can be used to construct roads above the flood level, and stable overflow sections can be constructed by covering a dip in the road with strong concrete and installing riprap on the sides. Installing larger bridges or culverts to permit the floodwater to drain away also helps.

This soil is in capability subclass VIw, undrained, and woodland suitability subclass 4w.

NlC2—Norden silt loam, 4 to 12 percent slopes, eroded. This moderately deep, gently sloping and sloping, well drained soil is on narrow, convex ridgetops and back slopes. Individual areas of this map unit are long and narrow or irregular in shape and range from about 3 to 50 acres in size.

In most cultivated areas, some of the original surface layer has been removed by erosion. The present cultivated surface layer in these areas is dark grayish brown silt loam about 9 inches thick and includes some brown and yellowish brown silt loam. The subsoil is about 26 inches thick. It is yellowish brown loam in the upper part and brownish yellow loam in the lower part. The substratum, about 4 inches thick, is brownish yellow loam in the upper part and very pale brown and olive brown fine sandy loam in the lower part. Weakly consolidated fine-grained glauconitic sandstone is at a depth of about 39 inches. In some places, the surface layer is loam. In some places, the depth to sandstone is less than 40 inches, and in places, the slope is slightly less than 4 percent.

Included with this soil in mapping are small areas of Council, Downs, and Urne soils. Council soils are well drained and are on foot slopes. Downs soils are moderately well drained and are on broader ridgetops. Both Council and Downs soils formed in loamy deposits and do not have the underlying sandstone of Norden soils. Urne soils are somewhat excessively drained and are on back slopes and shoulders. They have less clay in the subsoil than Norden soils. Also included are some small pits, some cut and filled areas, and some areas of Norden soils that have slopes of more than 12 percent. Some areas of somewhat poorly drained soils along drainageways are also included. These inclusions make up from 5 to 15 percent of the map unit.

Permeability and the available water capacity are moderate in this Norden soil. The organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is medium or rapid. The surface layer is very friable and easily tilled throughout a wide range in moisture content. Depth of rooting for most cultivated crops is limited by sandstone bedrock.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are used for unimproved pasture. Other areas are in woodland.

This soil is suited to grasses and legumes for hay and to limited amounts of corn, soybeans, and small grains. Where this soil is cultivated, further erosion is a moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, and installing terraces, diversions, and

grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in further erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of depth to rock. This limitation can be overcome by constructing a filtering mound of suitable material.

This soil is only moderately suited to dwellings without basements because of the moderate shrink-swell potential in the subsoil and because of slope in areas where it is greater than 6 percent. Shrinking and swelling of the soil with changes in moisture content can be overcome by excavating the soil and replacing it with a coarse material, such as sand or gravel, or by adding the proper amount of lime to the soil. Slope can be overcome by cutting, by cutting and filling, or where possible, by using areas of Norden soil in which the slope is less than 6 percent.

This soil is only moderately suited to dwellings with basements because of depth to rock, the moderate shrink-swell potential, and because of slope in areas where it is greater than 6 percent. Depth to rock can be overcome by excavating the soft sandstone with suitable power equipment, filling the site to raise its level, or by constructing the dwelling with a partly exposed basement to avoid excavating the sandstone. Shrinking and swelling can be overcome by removing the soil around the basement excavation and replacing it with a coarse material such as sand or gravel. Increasing the strength of the basement walls also overcomes the effect of shrinking and swelling. Slope can be overcome by cutting, cutting and filling, by making dwellings conform to the slope by the use of retaining walls, or by constructing dwellings on the existing slope in such a way that the basement floor on one side of the house is at ground level. If dwellings are constructed where the slope is less than 6 percent, slope is not a limitation.

This soil is only moderately suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic, because of slope, and because of a danger of frost damage. Low strength and frost damage can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage. Slope can be overcome by cutting and filling to shape the roadway or by building the road where the slope is less than 6 percent.

This soil is in capability subclass IIIe and woodland suitability subclass 2o.

NlD2—Norden silt loam, 12 to 20 percent slopes, eroded. This moderately deep, moderately steep, well drained soil is on upper foot slopes and back slopes. Individual areas of this map unit are long and narrow or irregular in shape and range from about 3 to 130 acres in size.

In most cultivated areas, the original surface layer has been removed by erosion. The present cultivated surface layer in these areas is brown silt loam about 8 inches thick that includes some dark yellowish brown and yellowish brown silt loam. The subsoil is about 18 inches thick. It is dark yellowish brown silt loam in the upper part, olive loam in the middle, and olive sandy loam in the lower part. The substratum, about 8 inches thick, is olive brown fine sand in the upper part and olive sandy loam in the lower part. Weakly consolidated fine-grained sandstone is at a depth of about 34 inches. In some places, the surface layer is fine sandy loam or loam. In some places, the depth to sandstone ranges from 40 to 60 inches.

Included with this soil in mapping are small areas of Council, Downs, and Urne soils. Council soils are well drained and are on head slopes and foot slopes. Downs soils are moderately well drained and are on broader ridgetops. Both Council and Downs soils formed in loamy deposits and do not have the underlying sandstone of Norden soils. Urne soils are somewhat excessively drained and are on back slopes, ridgetops, and shoulders. They have less clay in the subsoil than Norden soils. Also included are some small pits, some cut and filled areas, and some areas of Norden soils that have slopes of less than 12 percent or more than 20 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability and the available water capacity are moderate in this Norden soil. The organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is rapid. The surface layer is very friable and easily tilled throughout a wide range in moisture content. Depth of rooting for most cultivated crops is limited by sandstone bedrock.

Most areas of this soil are used for cultivated crops, hay, and pasture. Many areas are in woodland. Other areas are used for unimproved pasture.

This soil is poorly suited to cultivated crops, but it is suited to grasses and legumes for hay. Where this soil is used for cultivated crops, further erosion is a severe hazard. Corn, soybeans, and small grains can safely be grown if conservation practices are used. Proper management of crop residue, use of a conservation

tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. This use is effective in controlling erosion. Overgrazing, however, leads to a loss of plant cover, resulting in further erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. Soil related limitations to forest management are steepness of slope and plant competition following harvest. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival on steeper slopes facing south or west can be improved by care in planting and use of vigorous planting stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal. Skidding operations may expose sufficient mineral soil to allow adequate regeneration.

This soil is poorly suited to septic tank absorption fields because of depth to rock and slope. Depth to rock can be overcome by constructing a filtering mound of suitable material. Slope can be overcome by cutting or cutting and filling to reduce the slope, or by installing a trench absorption system on the contour.

This soil is poorly suited to dwellings with or without basements because of slope. For dwellings without basements, slope can be overcome by cutting or cutting and filling to reduce the slope. For dwellings with basements, slope can be overcome by cutting or cutting and filling to reduce the slope or by making dwellings conform to the slope by constructing retaining walls. It may also be desirable to construct dwellings on existing slope in such a way that the basement floor on one side of the house is at ground level.

This soil is poorly suited to local roads and streets because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass IVe and woodland suitability subclass 2r.

NuF—Norden, Urne, and Dorerton soils, 20 to 45 percent slopes. This map unit consists of moderately deep and deep, steep and very steep, well drained and somewhat excessively drained soils on ridgetops, shoulders, and back slopes. Individual areas of this map unit are irregular in shape and range from about 4 to 4,000 acres in size. They are 35 to 45 percent Norden soil, 30 to 40 percent Urne soil, and 0 to 10 percent Dorerton soil. These soils are primarily on valley slopes. They are similar enough in morphology and behavior characteristics that mapping them separately is not important for the objectives of the survey.

Typically, the Norden soil has a surface layer of very dark grayish brown loam about 3 inches thick. The subsurface layer is brown loam about 7 inches thick. The subsoil is about 19 inches thick. It is dark yellowish brown loam in the upper part, yellowish brown sandy clay loam in the middle, and dark yellowish brown loam in the lower part. Weakly consolidated fine-grained sandstone is at a depth of about 29 inches. In some places, the surface layer is silt loam or fine sandy loam. The depth to sandstone ranges from 40 to 60 inches in some places.

Typically, the Urne soil has a surface layer of very dark brown fine sandy loam about 2 inches thick. The subsoil is about 30 inches thick. It is light olive brown fine sandy loam in the upper part and olive brown fine sandy loam in the lower part. The substratum, about 6 inches thick, is grayish green fine sandy loam. Weakly consolidated fine-grained glauconitic sandstone is at a depth of about 38 inches. In some places, the surface layer is loamy fine sand, loam, or silt loam. In a few places, the depth to sandstone ranges from 40 to 60 inches.

Typically, the Dorerton soil has a surface layer of black silt loam about 4 inches thick. The subsurface layer is brown silt loam about 8 inches thick. The subsoil is about 15 inches thick. It is dark yellowish brown silt loam in the upper part and dark brown channery clay loam in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown very channery loam in the upper part and yellowish brown very channery fine sandy loam in the lower part.

Included with these soils in the mapping are small areas of Boone, Council, and Wildale soils. The excessively drained Boone soils are on lower valley slopes. They formed in sand over sandstone. The well drained Council soils are loamy throughout and are on slightly lower concave positions and on foot slopes. The well drained Wildale soils are on ridgetops and valley slopes. They formed in a thin silty mantle over clayey deposits. Also included are areas in which the slope is slightly less than 20 percent or greater than 45 percent and areas that have rock outcrops and stony spots in drainageways. Also included are some small pits and some cut and filled areas. These inclusions make up from 10 to 15 percent of the map unit.

Permeability is moderate in the Norden and Dorerton soils and moderately rapid in the Urne soil. Available water capacity is moderate in the Norden and Dorerton soils and low in the Urne soil. Organic matter content of the surface layer is moderately low in these soils. Surface water runoff is slow or medium.

Most areas of these soils are in woodland. Some areas are used for unimproved pasture. A few areas are used for cultivated hay or improved pasture.

These soils are generally unsuited to cultivated crops because of a very severe hazard of erosion. They are suited to grasses and legumes for hay.

These soils are suited to pasture. This use is effective in controlling erosion. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when these soils are wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. On lesser slopes where machinery can be operated, fertilization, liming, and renovation make it possible to grow improved pasture. These practices, as well as controlled grazing and restriction on use during wet periods, help to keep the soil and plant cover in good condition.

The Norden and Urne soils are suited to trees. Soil related limitations to forest management are steepness of slope and plant competition following harvest. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival on steeper slopes facing south or west can be improved by care in planting and use of vigorous planting stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal. Skidding operations may expose sufficient mineral soil to allow adequate regeneration.

The Dorerton soil is suited to trees. Equipment use is limited by soil depth and steepness of slope. Hand planting, contour planting, and careful placement of access roads help offset limitations to the use of equipment and aid in erosion control. Harvesting by clear-cut or area selection methods reduces windthrow of the trees that remain after harvest.

These soils are generally unsuited to septic tank absorption fields and dwellings with or without basements because of depth to rock and slope. The slope limitation is especially difficult to overcome, and a different building site should be selected.

These soils are poorly suited to local roads because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

These soils are in capability subclass VIe. The Norden soils are in woodland suitability subclass 2r, the Urne soils are in woodland suitability subclass 3r, and the Dorerton soils are in woodland suitability subclass 4f.

Pa—Palms muck. This deep, nearly level, very poorly drained soil is in broad depressions and flood plains. It is subject to ponding. Individual areas of this map unit are irregular in shape and range from about 3 to 150 acres in size.

Typically, the organic layer is black muck about 34 inches thick. The substratum to a depth of about 60 inches is dark gray silty clay loam. In some places, the substratum is silt loam, loam, or fine sandy loam. In some places, silt loam as much as 15 inches thick covers the organic layer.

Included with this soil in mapping are small areas of Ettrick and Houghton soils. Ettrick soils are poorly drained and are on higher positions on the landscape. They are silty throughout. Houghton soils are on similar positions on the landscape. They formed in organic material more than 51 inches thick. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderately rapid in the organic layers and moderately slow in the substratum in this Palms soil. The available water capacity and organic matter content of the organic layers are very high. This soil has a seasonal high water table above the surface or within 1 foot of the surface during wet periods. Surface water runoff is very slow or ponded, but a few areas, mostly in narrow flood plains, are commonly flooded.

Most areas of this soil are undrained and are in native wetland vegetation. Drained areas are used for cultivated crops. Some areas are used for unimproved pasture.

Where drained, this soil is suited to cultivated crops, but frost damage to crops is a severe hazard. Because of cold air drainage, there are fewer frost-free days per growing season on this soil than on adjacent upland soils. Both deep ditches and tile are used for subsurface drainage, but in some areas suitable outlets are not available. Ditchbanks are easily eroded by flowing water, and vertical banks are likely to cave and plug the ditch. In a few areas, dikes and diversions are used to prevent flooding.

Drained areas of this soil are subject to burning, and cultivated areas are subject to soil blowing. Excessive lowering of the water table in this soil increases subsidence. Controlled drainage helps minimize subsidence. This soil is compressible, and widetrack equipment is most useful in farming this soil.

Where drained, this soil is suited to pasture. Undrained areas are poorly suited to pasture.

This soil is suited to trees. Soil wetness and a high water table during the tree planting season limit reforestation to natural regeneration. Harvest with heavy equipment is limited to periods when the soil is frozen. Harvesting by clear-cut or area-selection methods helps reduce windthrow of the remaining trees. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings because of subsidence and ponding, and because it does not have sufficient strength to adequately support building foundations. These problems are difficult to overcome, and a different building site should be selected.

This soil is poorly suited to local roads because of ponding, a danger of frost damage, and because it does not have sufficient strength to adequately support vehicular traffic. Low strength and frost damage can be overcome by excavating the organic layers and replacing them with a coarse base material, such as sand or gravel, and by increasing the thickness of pavement. Ponding can be overcome by removing surface water through suitable outlets with culverts and ditches or by using fill material to construct roads above the ponding level. Installing culverts also helps prevent road damage by equalizing the water level on both sides of the road.

This soil is in capability subclass IIIw, drained, and woodland suitability subclass 3w.

Pd—Pits. These are areas from which limestone, weathered sandstone, or loose sand has been removed to a depth of at least several feet. Individual areas are irregular in shape and range from about 3 to 25 acres in size. Typically, the material in the bottom and sidewalls is limestone, sandstone, or sand.

Included with this unit in mapping are areas of spoil, or soil pushed from the pit area before excavation, and piles of material that have not been removed from around the pit.

Pits in limestone are near areas of Valton and Wildale soils (fig. 13). Pits from which weathered sandstone has been removed are mostly in areas of Boone, Dorerton, Eleva, Norden, and Urne soils. Pits in loose sand are mostly in areas of Impact and Tarr soils. Soil material associated with pits in limestone is typically clayey, and that associated with sandstone is loamy or sandy. Soil material associated with pits in loose sand is sandy and droughty. Other soil properties are too variable to rate.

Many pits are still in use; others have been abandoned, and brush and weeds have grown up in them. Some abandoned pits are partly filled with water.

The main management concern is reclamation of the Pits area after excavation. To support a vegetative cover, most areas require filling, land shaping, and the addition of suitable topsoil.

Suitability of these areas for septic tank absorption fields and for dwellings with or without basements should be determined by onsite investigation. Pits that formed in sandy deposits readily absorb the effluent from septic tank absorption fields, but the sand does not adequately filter the effluent and pollution of ground water supplies may result. There is a similar danger if septic tank absorption fields are placed in areas of limestone and sandstone Pits. Small Pits make suitable basement excavations for dwellings with basements. Pits are generally unsuitable for local roads because of slope.

Pits are not assigned to a capability subclass or a woodland suitability subclass.

Pm—Psammaquents, nearly level. These deep, poorly drained soils are in depressions and on flood plains. They are protected from natural flooding by dikes and ditches but are flooded on a controlled basis to produce cranberries (fig. 14). Individual areas of this map unit are rectangular in shape and range from about 15 to 150 acres in size.

Typically, Psammaquents are sand or loamy sand and range widely in color and thickness of the individual horizons or layers. Generally, they are the lower part of the subsoil or the substratum of sandy soils from which the upper 20 to 40 inches has been removed to form surrounding dikes. In some places, they are sandy deposits spread over organic soils.

Included with Psammaquents in mapping are small areas of Au Gres, Dawson, Loxley, Meehan, and Tarr soils. Au Gres and Meehan soils are somewhat poorly drained. They formed in sandy deposits along drainageways and in slight depressions. Dawson and Loxley soils are very poorly drained organic soils in large depressions and on flood plains. Tarr soils are moderately well drained. They formed in sandy deposits on bottom slopes in slight depressions and along drainageways. Also included are ditches and dikes and piles of sand. These inclusions make up from 5 to 10 percent of the map unit.

Permeability is rapid in these Psammaquents. The available water capacity and organic matter content are low. These soils have a seasonal high water table above or within 1.5 feet of the surface. Surface water runoff is ponded.

These soils are suited to cranberries, and this is their major use. They are generally unsuited to most other crops because of wetness and, in some places, a danger of frost damage. It would be necessary to remove the dikes and refill these areas to make these soils suitable for other cultivated crops, hay, pasture, or trees.

These soils are generally unsuited to septic tank absorption fields, to dwellings with or without basements, and to local roads because of wetness. If the dikes surrounding these soils are removed, some areas are subject to flooding. These problems are difficult to overcome, and a different building site should be selected.

Psammaquents are not assigned to a capability subclass or woodland suitability subclass.

Ps—Psamments, nearly level. This map unit consists of fill material that has been smoothed over wet mineral or organic soils and is used for building sites, streets, and parking lots. These areas are on flood plains of major drainageways, along lakes, and in other low-lying areas. Individual areas of this map unit are irregular in shape and range from about 3 to 125 acres in size.

Typically, Psamments are sand or loamy sand which have a wide range in color because of mixing of the fill material. The thickness of the fill ranges from about 1

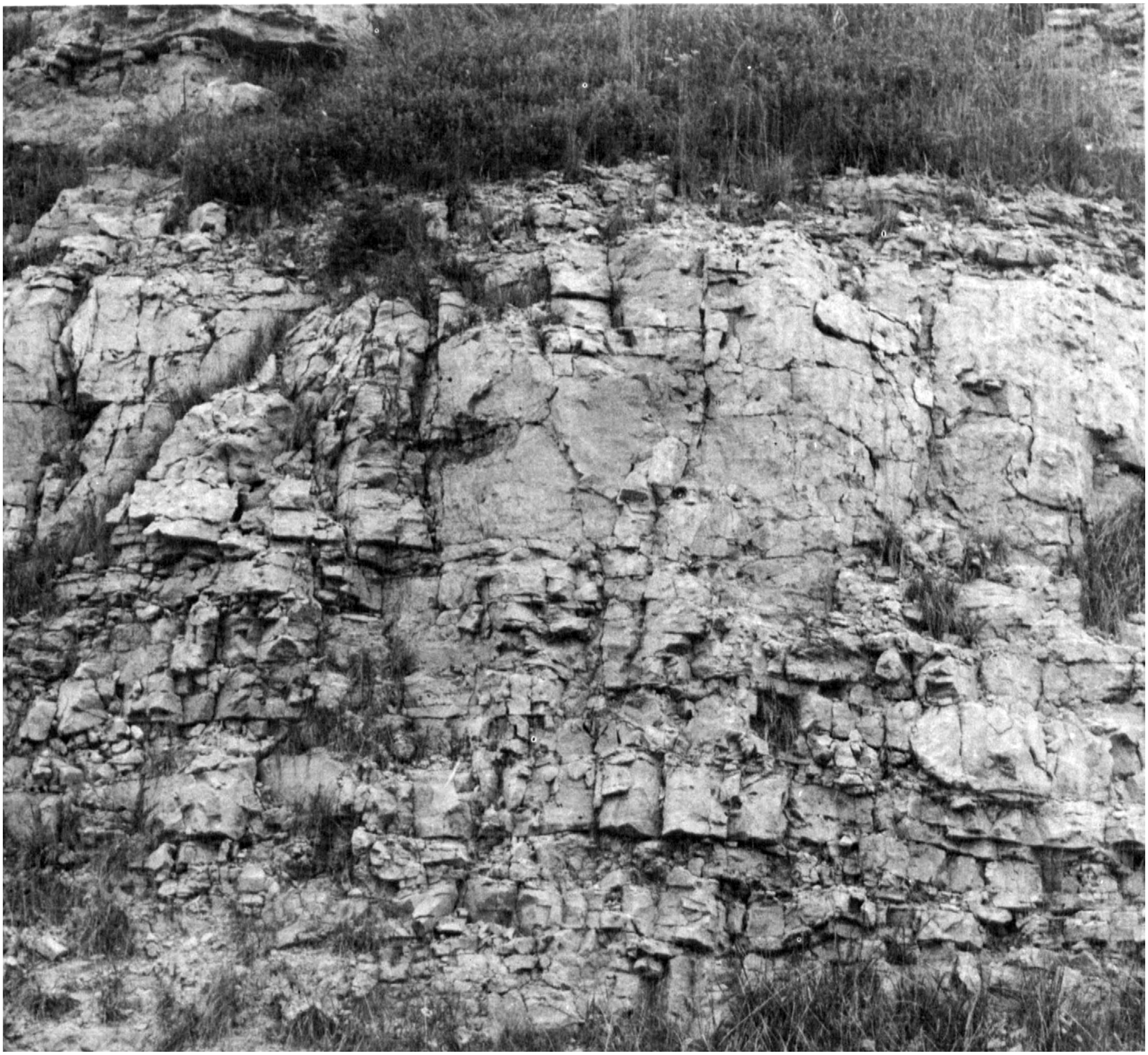


Figure 13.—Pit exposure of limestone in an area of Valton and Wildale soils. Limestone is ground and used principally for road construction and agricultural lime.

foot to 4 feet. In some places, the fill is loamy or is non-soil material such as broken concrete, stone, or gravel.

Included with this unit in mapping are small areas of Dawson, Ettrick, Kato, and Newson soils which have not been covered. Dawson soils are very poorly drained organic soils underlain by sand. Ettrick, Kato, and Newson soils are poorly drained. Ettrick soils developed in silty deposits. Kato soils have a silty surface layer and subsoil underlain by sand. Newson soils are sandy throughout. These inclusions make up from 2 to 10 percent of the map unit.

Psamments have a seasonal high water table at a depth of 1 foot to 5 feet. The permeability, available water capacity, and organic matter content are too variable to rate. Surface water runoff is slow.

Most areas are used for urban development or cottages. The present uses of these soils make it difficult to rate their suitability for cultivated crops, pasture, and

Figure 14.—Cranberries being harvested in an area of Psammaquents, nearly level. Monroe County is second in cranberry production in Wisconsin, which leads the nation in production.

trees. Some areas of these soils are used for gardens, lawns, and ornamental trees and shrubs. Unimproved areas support native grasses and forbs.

The suitability of Psamments for septic tank absorption fields and for dwellings with or without basements can only be determined by onsite investigation. Psamments are suited to local roads and streets.

Psamments are not assigned to a capability subclass or to a woodland suitability subclass.

RbA—Reedsburg silt loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is on broad, slightly concave ridgetops. Individual areas of this map unit are irregular in shape and range from about 3 to 150 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil extends to a depth greater than 60 inches. It is yellowish brown silt loam in the upper part; brown, mottled silty clay loam in the middle; and mixed strong brown and red, mottled cherty clay in the lower part. In a few places, the depth to cherty clay is greater than 60 inches.

Included with this soil in mapping are small areas of Atterberry, Valton, and Wildale soils. Atterberry soils are

somewhat poorly drained and are on landscape positions similar to those of Reedsburg soils. Valton and Wildale soils are well drained and are on higher convex areas of ridgetops. They formed in similar deposits. Also included are some areas of poorly drained soils in depressions. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is moderate in the upper and middle parts of the subsoil and slow in the lower clayey part of the subsoil in this Reedsburg soil. The available water capacity and organic matter content of the surface layer are moderate. This soil has a seasonal high water table at a depth of 1 foot to 3 feet. Surface water runoff is slow. The surface layer is very friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are in woodland.

Where drained, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Surface drainage ditches and land grading are used to remove excess surface water more rapidly. Deep ditches and, in a few areas, tile are used for subsurface drainage. In undrained areas of this soil that are cultivated, tillage and harvest are frequently delayed by wetness. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface help maintain good tilth.

Where drained, this soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover and encourages the growth of undesirable plants. Grazing when the surface layer is wet causes surface compaction and results in poor tilth. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration. It can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of wetness and slow permeability. These limitations can be overcome by constructing a filtering mound of suitable material.

This soil is poorly suited to dwellings with or without basements because of wetness and to dwellings with basements because of the high shrink-swell potential. For dwellings without basements, wetness can be overcome by installing a subsurface drainage system that has a gravity outlet or other dependable outlet, and by filling the site to raise its elevation. For dwellings with basements, wetness can be overcome by constructing basement above the level of wetness, and by installing a subsurface drainage system that has a gravity outlet or other dependable outlet. Shrinking and swelling of the soil with changes in moisture content can be overcome by removing the soil around and below the basement excavation and replacing it with coarse material, such as sand or gravel, and by increasing the strength of the basement walls. Shrinking and swelling can also be reduced by installing a subsurface drainage system around the dwelling at or below the basement walls to keep the soil dry.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of a danger of frost damage. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of the pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIw and woodland suitability subclass 2o.

RbB—Reedsburg silt loam, 2 to 6 percent slopes. This deep, gently sloping, somewhat poorly drained soil is on broad, concave ridgetops. Individual areas of this map unit are irregular in shape and range from about 3 to 500 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil extends to a depth of more than 60 inches. It is yellowish brown silt loam in the upper part; brown and pale brown, mottled silty clay loam in the middle; and strong brown, dark red, and yellowish red, mottled cherty clay in the lower part. In some places, the depth to cherty clay is more than 60 inches.

Included with this soil in mapping are small areas of Atterberry, Valton, and Wildale soils. Atterberry soils are somewhat poorly drained and are on landscape positions similar to those of Reedsburg soils. Valton and Wildale soils are well drained and are on higher convex areas of ridgetops. They formed in similar deposits. Also included are some areas of poorly drained soils in depressions. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is moderate in the upper and middle parts of the subsoil and very slow in the lower clayey part of the subsoil in this Reedsburg soil. The available water capacity and organic matter content of the surface layer are moderate. This soil has a seasonal high water table at a depth of 1 foot to 3 feet. Surface water runoff from cultivated areas is medium. The surface layer is very friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are in woodland. Other areas are used for unimproved pasture.

Where drained, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Surface drainage ditches and land grading are used to remove excess surface water more rapidly. In a few places, deep ditches and tile are used for

subsurface drainage. In undrained areas of this soil that are cultivated, tillage and harvest are frequently delayed by wetness. Where this soil is cultivated, erosion is a slight or moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

Where drained, this soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover and encourages the growth of undesirable plants. Grazing when the surface layer is wet causes surface compaction, resulting in poor tilth and increased runoff and erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of wetness and slow permeability. These limitations can be overcome by constructing a filtering mound of suitable material.

This soil is poorly suited to dwellings with or without basements because of wetness and to dwellings with basements because of the high shrink-swell potential. For dwellings without basements, wetness can be overcome by installing a subsurface drainage system that has a gravity outlet or other dependable outlet, and by filling the site to raise its elevation. For dwellings with basements, wetness can be overcome by constructing the basement above the level of wetness and by installing a subsurface drainage system that has a gravity outlet or other dependable outlet. Shrinking and swelling of the soil with changes in moisture content can be overcome by removing the soil around and below the basement excavation and replacing it with coarse material, such as sand or gravel, and by increasing the strength of the basement walls. Installing a subsurface drainage system around the dwelling at or below the basement walls to keep the soil dry also reduces shrinking and swelling of the soil.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of a danger of frost damage. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, or increasing the thickness of pavement and by providing good surface and subsurface drainage.

This soil is in capability subclass IIe and woodland suitability subclass 2o.

SfA—Shiffer loam, 0 to 3 percent slopes. This deep, nearly level and gently sloping, somewhat poorly drained soil is in slight depressions and along drainageways near major streams and drainageways. It is subject to occasional flooding. Individual areas of this map unit are irregular in shape and range from about 5 to 50 acres in size.

Typically, the surface layer is very dark gray loam about 9 inches thick. The subsoil is about 20 inches thick. It is dark brown and brown, mottled loam in the upper part and pale brown, mottled sandy loam in the lower part. The substratum to a depth of about 60 inches is very pale brown, mottled loamy sand. In some places, the surface layer is sandy loam or silt loam. Also, in some places, loamy or silty strata are in the substratum.

Included with this soil in mapping are small areas of Kato, Lows, and Meridian soils. Kato and Lows soils are poorly drained and are in depressions on flood plains. Meridian soils are well drained and are on higher terraces. These included soils formed in deposits similar to those in which Shiffer soils formed; however, Kato soils have more silt in the subsoil than Shiffer soils. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Shiffer soil. The available water capacity and organic matter content of the surface layer are moderate. This soil has a seasonal high water table at a depth of 1 foot to 3 feet. Surface water runoff is slow. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland.

Where drained, this soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Diversions and surface drainage ditches are used to remove excess surface water more rapidly. Deep ditches and tile are used in some areas for subsurface drainage. However, where tile are placed in the underlying loamy sand, precautions must be taken to prevent loose sand from entering the tile lines. These precautions include placing filter material, such as topsoil, straw, hay, coarse sand-gravel mixtures, or artificial fabric wrappings, over the tile. Ditchbanks are easily eroded by flowing water, and vertical banks are likely to cave and plug the ditch. In undrained areas of this soil that are cultivated, tillage and harvest are occasionally delayed by wetness. Proper management of crop residue and use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface helps to maintain good tilth.

Where drained, this soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover and encourages the growth of undesirable plants. Grazing when the surface layer is wet causes surface compaction, resulting in poor tilth and increased runoff.

Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings because of flooding, wetness, and rapid permeability in the substratum. These problems are difficult to overcome, and a building site should be selected which is not subject to flooding.

This soil is poorly suited to local roads because of flooding and a danger of frost damage. To overcome flooding, fill material can be used to construct roads above the flood level and stable overflow sections can be constructed by covering a dip in the road with strong concrete and installing riprap on the sides. Installing larger bridges or culverts to permit the floodwater to drain away also helps. Frost damage can be overcome by using subsurface drainage to drain the roadbed and by replacing the upper part of the soil with a coarse base material such as sand or gravel.

This soil is in capability subclass IIw and woodland suitability subclass 3o.

TrB—Tarr sand, 0 to 6 percent slopes. This deep, nearly level and gently sloping, excessively drained soil is on broad stream terraces and toe slopes. Individual areas of this map unit are irregular in shape and range from about 3 to 1,500 acres in size.

Typically, the surface layer is very dark brown sand about 4 inches thick. It is covered by about 2 inches of leaf litter. The subsoil is dark yellowish brown sand about 28 inches thick. The substratum to a depth of about 60 inches is yellowish brown sand. In some places, loamy strata are in the substratum.

Included with this soil in mapping are small areas of Billett and Boone soils. The well drained Billett soils are on lower terraces and have a loamy surface layer and subsoil. Boone soils are underlain by sandstone and are on higher back slopes. Also included are small areas of Tarr soils that have slopes of more than 6 percent. Also included are some small pits, some cut and filled areas, and some small areas of silty or loamy colluvium. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is rapid and available water capacity is low in this Tarr soil. The organic matter content of the surface layer is very low. Surface water runoff is slow. The surface layer is friable and easily tilled over a wide range in moisture content.

Most areas of this soil are in woodland (fig. 15). A few areas are used for cultivated crops, hay, and pasture. Some areas are used for unimproved pasture.

This soil is poorly suited to corn, soybeans, and small grains and to legumes and grasses for hay, because crop yields during most seasons are limited by the low available water capacity. This soil is suited to sprinkler irrigation, and if it is irrigated, better and more consistent crop yields can be expected. Because of rapid permeability in this soil, irrigation rates should be limited to prevent leaching of plant nutrients from the root zone. Water erosion is generally not a problem, but this soil is subject to soil blowing. Proper management of crop residue, use of a conservation tillage system, such as

Figure 15.—Red pine plantation on Tarr sand. Many areas of sandy and droughty soils, such as Tarr, have been planted to pine trees.

chisel planting, that leaves a protective amount of crop residue on the soil surface, stripcropping, and planting field windbreaks and winter cover crops help control soil blowing.

This soil is poorly suited to pasture, but this use is effective in controlling soil blowing. Forage yields are low unless this soil is fertilized, limed, and irrigated. Planting in early spring, before the soil has a chance to dry, is best on this soil. Crops planted later have a poor likelihood of survival. Overgrazing leads to a loss of plant cover, resulting in soil blowing. Fertilization, liming, renovation, irrigation, and controlled grazing help to maintain plant cover.

This soil is suited to trees. The rate of seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies. This limitation can be overcome by building a filtering mound of suitable material.

This soil is suited to dwellings with or without basements and to local roads and streets.

This soil is in capability subclass IVs and woodland suitability subclass 3s.

TrC—Tarr sand, 6 to 12 percent slopes. This deep, sloping, excessively drained soil is on foot slopes and back slopes. Individual areas of this map unit are irregular in shape and range from about 3 to 600 acres in size.

Typically, the surface layer is very dark grayish brown sand about 2 inches thick. It is covered by about 1 inch of leaf litter. The subsoil is dark yellowish brown sand about 34 inches thick. The substratum to a depth of about 60 inches is yellow sand. In some places, loamy strata are in the substratum.

Included with this soil in mapping are small areas of Billett and Boone soils. The well drained Billett soils have a loamy surface layer and subsoil and are on similar positions on the landscape. The excessively drained Boone soils are on higher ridgetops and valley slopes and are underlain by sandstone. Also included are some small pits, some cut and filled areas, and some small areas of silty or loamy colluvium. Also included are some areas of Tarr soils that have slopes of less than 6 percent or more than 12 percent. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is rapid and available water capacity is low in this Tarr soil. The organic matter content of the surface layer is very low. Surface water runoff is slow or medium. The surface layer is friable and easily tilled over a wide range in moisture content.

Most areas of this soil are in woodland. Some areas are used for unimproved pasture. A few areas are used for cultivated crops, hay, and improved pasture.

This soil is generally unsuited to cultivated crops because of low available water capacity and a high susceptibility to soil blowing and water erosion. Where slopes are less than about 8 percent, this soil is suited to sprinkler irrigation, especially if some land leveling is done. If the soil is irrigated, it is suited to corn, soybeans, and small grains and to legumes and grasses for hay and pasture. Because of rapid permeability in this soil, irrigation rates should be limited to prevent the washing of plant nutrients out of the root zone. In areas where this soil is cultivated, water erosion is a moderate hazard, and soil blowing may occur as well. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, wind and contour stripcropping, planting field windbreaks and winter cover crops, and constructing grassed waterways help control erosion and soil blowing.

This soil is poorly suited to pasture, but this use is effective in controlling water erosion and soil blowing. Forage yields are low unless this soil is fertilized, limed, and irrigated. Planting in early spring, before the soil has a chance to dry, is best on this soil. Later plantings have a poor likelihood of survival. Overgrazing leads to a loss of plant cover, resulting in water erosion and soil blowing. Fertilization, liming, renovation, and controlled grazing help to maintain plant cover.

This soil is suited to trees. The rate of seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies. This limitation can be overcome by building a filtering mound of suitable material.

This soil is only moderately suited to dwellings with or without basements because of slope. For dwellings without basements, slope can be overcome by cutting or cutting and filling. For dwellings with basements, slope can be overcome by cutting, by cutting and filling, or by making dwellings conform to the slope by constructing retaining walls. It may also be desirable to construct dwellings on the existing slope in such a way that the basement floor on one side of the house is at ground level. It may also be possible to construct dwellings on included areas in which the slope is less than 6 percent.

This soil is only moderately suited to local roads and streets because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass VIs and woodland suitability subclass 3s.

TrD—Tarr sand, 12 to 20 percent slopes. This deep, moderately steep, excessively drained soil is on foot slopes and back slopes. Individual areas of this map unit are long and narrow and range from about 3 to 175 acres in size.

Typically, the surface layer is black sand about 2 inches thick. The subsoil is about 34 inches thick. It is dark yellowish brown sand in the upper part and yellowish brown sand in the lower part. The substratum to a depth of about 60 inches is yellow sand. In some places, loamy strata are in the substratum.

Included with this soil in mapping are small areas of Billett and Boone soils. The well drained Billett soils are on landscape positions similar to those of Tarr soils but have a loamy surface layer and subsoil. The excessively drained Boone soils are on valley slopes and are underlain by sandstone. Also included are some small pits, some cut and filled areas, some small areas of silty or loamy colluvium, and areas of Tarr soils that have slopes of less than 12 percent or greater than 20 percent. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is rapid and available water capacity is low in this Tarr soil. The organic matter content of the surface layer is very low. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled over a wide range in moisture content.

Most areas of this soil are in woodland. Some areas are used as umimproved pasture. A few areas are used for cultivated crops, hay, and pasture.

This soil is unsuited to cultivated crops because of a low available water capacity, a severe and very severe hazard of water erosion, and a hazard of soil blowing.

This soil is poorly suited to pasture, but this use is effective in controlling water erosion and soil blowing. Planting in early spring, before the soil has a chance to dry, is best on this soil. Later plantings have a poor likelihood of survival. Overgrazing leads to a loss of plant cover and results in water erosion and soil blowing. Fertilization, liming, renovation, and controlled grazing help to maintain plant cover.

This soil is suited to trees. Erosion can be controlled by planting trees on the contour and by careful placement of skidroads during harvest. The survival rate of planted trees may be increased by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to use as sites for septic tank absorption fields because of slope and because the soil does not adequately filter the effluent. The slope limitation can be reduced by cutting or cutting and filling to reduce the slope, or by installing a trench absorption system on the contour. The poor filtering capacity may result in the pollution of ground water supplies, but this limitation can be overcome by building a filtering mound of suitable material.

This soil is poorly suited to dwellings with or without basements because of slope. For dwellings without basements, this limitation can be overcome by cutting or by cutting and filling. For dwellings with basements, slope can be overcome by cutting, by cutting and filling, or by making dwellings conform to the slope by constructing retaining walls. It may also be desirable to construct dwellings on the existing slope in such a way that the basement floor on one side of the house is at ground level.

This soil is poorly suited to local roads and streets because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in a less sloping area.

This soil is in capability subclass VIIs and woodland suitability subclass 3s.

TrE—Tarr sand, 20 to 45 percent slopes. This deep, steep and very steep, excessively drained soil is on back slopes. Individual areas of this map unit are long and narrow and range from about 3 to 1,000 acres in size.

Typically, the surface layer is very dark gray sand about 4 inches thick. The subsoil is yellowish brown sand about 24 inches thick. The substratum to a depth of about 60 inches is brownish yellow sand. In some places, the slope is less than 20 percent or greater than 45 percent. Also, in some places, loamy strata are in the substratum.

Included with this soil in mapping are small areas of Boone soils. The excessively drained Boone soils are on valley slopes and are underlain by sandstone. Also included are some small pits, some cut and filled areas, and some small areas of silty and loamy colluvium. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is rapid and the available water capacity is low in this Tarr soil. The organic matter content of the surface layer is very low. Surface water runoff is medium. The surface layer is friable and easily tilled over a wide range in moisture content.

Almost all areas of this soil are in woodland. This soil is unsuited to cultivated crops because of a very severe hazard of water erosion, a hazard of soil blowing, and the low available water capacity.

This soil is poorly suited to pasture, but this use is effective in controlling water erosion and soil blowing. Forage yields are low. On the lesser slopes where machinery can be operated, planting in early spring before the soil has a chance to dry is best. Later plantings have a poor likelihood of survival. Overgrazing leads to a loss of plant cover, resulting in water erosion and soil blowing. Fertilization, liming, renovation, and controlled grazing help to maintain plant cover.

This soil is suited to trees. Erosion can be controlled by planting trees on the contour and by careful placement of skidroads during harvest. The survival rate of planted trees can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings because of slope. Additionally, it does not adequately filter the effluent, which can pollute ground water supplies. The slope limitation is especially difficult to overcome, and a different building site should be selected.

This soil is poorly suited to local roads because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass VIIs and woodland suitability subclass 3s.

TsA—Tarr sand, moderately well drained, 0 to 3 percent slopes. This deep, nearly level and gently sloping, moderately well drained soil is in slight depressions and along drainageways. Individual areas of this map unit are irregular in shape and range from about 4 to 900 acres in size.

Typically, the surface layer is very dark grayish brown sand about 7 inches thick. The subsoil is about 31 inches thick. It is yellowish brown sand in the upper part and mixed light gray and strong brown sand in the lower part. The substratum to a depth of about 60 inches is light yellowish brown, mottled sand. In some places, the surface layer is fine sand or loamy sand.

Included with this soil in mapping are small areas of Au Gres, Impact, and Meehan soils. The somewhat poorly drained Au Gres and Meehan soils are along drainageways on terraces and lake plains. The excessively drained Impact soils are on convex stream terraces and valley slopes. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is rapid and available water capacity is low in this Tarr soil. The organic matter content of the surface layer is very low. This soil has a seasonal high water table at a depth of 3 to 6 feet. Surface water runoff is slow. The surface layer is very friable and easily tilled throughout a wide range in moisture content.

Most areas of this soil are in woodland. Some areas are used for cultivated crops, hay, and pasture. Other areas are used for unimproved pasture.

This soil is poorly suited to corn, soybeans, and small grains and to legumes and grasses for hay. Crop yields during most seasons are limited by low available water capacity. This soil is suited to sprinkler irrigation, and if it is irrigated, better and more consistent crop yields can be expected. Because of the rapid permeability of this soil, irrigation rates should be limited to prevent the washing of plant nutrients out of the root zone. Water erosion is generally not a hazard on this soil, but soil blowing may occur. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, wind stripcropping, and planting field windbreaks and winter cover crops help control soil blowing.

This soil is poorly suited to pasture, but this use is effective in controlling soil blowing. Forage yields are low unless this soil is fertilized, limed, and irrigated. Planting in early spring, before the soil has a chance to dry, is best on this soil. Later plantings have a poor likelihood of survival. Overgrazing leads to a loss of plant cover and results in soil blowing. Fertilization, liming, renovation, irrigation and controlled grazing help to maintain plant cover.

This soil is suited to trees. Seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of wetness and rapid permeability. It readily absorbs the effluent from septic tanks, but it does not adequately filter the effluent. The poor filtering capacity may result in the pollution of ground water supplies. Wetness and rapid permeability can be overcome by constructing a filtering mound of suitable material. It may also be possible to pump the effluent to an absorption field located on higher, more suitable soils.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of wetness. Wetness can be overcome by constructing the basement above the level of wetness or by installing a subsurface drainage system that has a gravity outlet or some other dependable outlet.

This soil is suited to local roads and streets.

This soil is in capability subclass IVs and woodland suitability subclass 3s.

UfC2—Urne fine sandy loam, 4 to 12 percent slopes, eroded. This moderately deep, gently sloping and sloping, somewhat excessively drained soil is on narrow, convex ridgetops. Individual areas of this map unit are long and narrow or irregular in shape and range from about 3 to 50 acres in size.

In most cultivated areas, some of the original surface layer has been removed by erosion. The present surface layer is mostly dark grayish brown fine sandy loam about 8 inches thick that includes dark yellowish brown and yellowish brown fine sandy loam. The subsoil is about 19 inches thick. It is dark yellowish brown fine sandy loam in the upper part and yellowish brown fine sandy loam in the lower part. The substratum, about 11 inches thick, is olive yellow loamy fine sand. Weakly consolidated fine-grained sandstone is at a depth of about 38 inches. In

some places, the surface layer is very fine sandy loam, loam, or silt loam. In some places, the underlying sandstone is at a depth ranging from 40 to 60 inches, and in places, the slope is slightly less than 4 percent.

Included with this soil in mapping are small areas of Council, La Farge, and Norden soils. These soils are well drained. Council soils are on lower foot slopes and are loamy throughout. La Farge and Norden soils are on ridgetops and contain more clay in the subsoil than Urne soils. Also included are some small pits, some cut and filled areas, and a few areas of Urne soils that have slopes of more than 12 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderately rapid in this Urne soil. The available water capacity and organic matter content of the surface layer are low. Surface water runoff from cultivated areas is medium. The surface layer is very friable and easily tilled over a wide range in moisture content. Depth of rooting for most cultivated crops is restricted by sandstone bedrock.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland. A few areas are used for unimproved pasture.

This soil is suited to grasses and legumes for hay and to corn, soybeans, and small grains. Where this soil is used for cultivated crops, water erosion and soil blowing are a moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control water erosion and soil blowing.

This soil is well suited to pasture, but forage yields are generally low. This use is effective in controlling erosion. Overgrazing leads to a loss of plant cover, resulting in water erosion and soil blowing. Renovation, fertilization, liming, and controlled grazing help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of the depth to rock. This limitation can be overcome by constructing a filtering mound of suitable material.

In areas where slope is greater than 6 percent, this soil is only moderately suited to dwellings without basements because of slope. This limitation can be overcome by cutting or cutting and filling to reduce the slope, or where possible, by using areas of Urne soil in which the slope is less than 6 percent.

This soil is only moderately suited to dwellings with basements because of depth to rock and slope. Depth to rock can be overcome by excavating the soft sandstone with suitable power equipment, by filling the site to raise its level, or by constructing dwellings with partly exposed basements to avoid excavating the sandstone. Slope can be overcome by cutting or cutting and filling to reduce the slope, by making dwellings conform to the slope by constructing retaining walls, or by constructing dwellings on existing slopes in such a way that the basement floor on one side of the house is at ground level. Constructing dwellings where the slope is less than 6 percent also eliminates the slope as a limitation.

This soil is only moderately suited to local roads and streets because of slope and a danger of frost damage. Slope can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope. Frost damage can be overcome by using subsurface drainage to drain the roadbed and by replacing the upper part of the soil with a coarse base material, such as sand or gravel.

This soil is in capability subclass IIIe and woodland suitability subclass 3o.

UfD2—Urne fine sandy loam, 12 to 20 percent slopes, eroded. This moderately deep, moderately steep, somewhat excessively drained soil is on back slopes and the upper part of shoulders. Individual areas of this map unit are long and narrow or irregular in shape and range from about 4 to 200 acres in size.

In most cultivated areas, some of the original surface layer has been removed by erosion. The present surface layer in these areas is mostly dark grayish brown fine sandy loam about 8 inches thick that includes some dark yellowish brown and yellowish brown fine sandy loam. The subsoil is dark yellowish brown and yellowish brown fine sandy loam about 17 inches thick. The substratum, about 8 inches thick, is light olive brown fine sandy loam. Weakly consolidated fine-grained sandstone is at a depth of about 33 inches. In some small areas, the surface layer is very fine sandy loam, loam, or silt loam. In some places, the underlying sandstone is at a depth ranging from 40 to 60 inches.

Included with this soil im mapping are small areas of Council, La Farge, and Norden soils. These soils are well drained. Council soils are on foot slopes, and La Farge and Norden soils are on ridgetops. Council soils are loamy throughout. La Farge and Norden soils contain more clay in the subsoil than Urne soils. Also included are some small pits, some cut and filled areas, and some areas of Urne soils that have slopes of less than 12 percent or more than 20 percent. These inclusions make up from 10 to 15 percent of the map unit.

Permeability is moderately rapid in this Urne soil. The available water capacity and organic matter content of the surface layer are low. Surface water runoff from cultivated areas is rapid. The surface layer is very friable and easily tilled over a wide range in moisture content. Depth of rooting for most cultivated crops is restricted by sandstone bedrock.

Many areas of this soil are used for growing crops, hay, and pasture. Many other areas are in woodland. Some areas are used for unimproved pasture.

This soil is poorly suited to cultivated crops, but it is suited to grasses and legumes for hay. Where this soil is used for cultivated crops, further erosion is a severe hazard and soil blowing is a hazard. Corn, soybeans, and small grains can be grown if erosion control practices are used. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and installing diversions and grassed waterways help control erosion and soil blowing.

This soil is suited to pasture, but forage yields are generally low. This use is effective in controlling erosion. Overgrazing leads to a loss of plant cover, resulting in water erosion and soil blowing. Renovation, fertilization, liming, and controlled grazing help to keep the soil and plant cover in good condition.

This soil is suited to trees. Soil related limitations to forest management are steepness of slope and plant competition following harvest. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival on steeper slopes facing south or west can be improved by care in planting and use of vigorous planting stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal. Skidding operations may expose sufficient mineral soil to allow adequate regeneration.

This soil is poorly suited to septic tank absorption fields because of slope. This problem can be overcome by cutting, by cutting and filling, or by installing a trench absorption system on the countour.

This soil is poorly suited to dwellings with or without basements because of slope. For dwellings without basements, slope can be overcome by cutting or cutting and filling to reduce the slope. For dwellings with basements, slope can be overcome by cutting or cutting and filling to reduce the slope, or by making dwellings conform to the slope by constructing retaining walls. It may also be desirable to construct dwellings on existing slope in such a way that the basement floor on one side of the house is at ground level.

This soil is poorly suited to local roads and streets because of slope. This limitation can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass IVe and woodland suitability subclass 3r.

VaB—Valton silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on broad, convex ridgetops. Individual areas of this map unit are long and narrow or irregular in shape and range from about 5 to 500 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil extends to a depth of more than 60 inches. It is dark yellowish brown silt loam in the upper part, brown silty clay loam in the middle, and reddish brown and yellowish red clay in the lower part. Some areas are eroded and have brown subsoil mixed with the surface layer. In some places, the depth to clayey subsoil is slightly more than 36 inches. In some places, as much as 55 percent of the clayey subsoil is chert. Also, in some places, strata or pockets of sandy loam, sandy clay loam, or sandy clay are in the clayey subsoil, and in some places, the slope is slightly less than 2 percent.

Included with this soil in mapping are small areas of Atterberry, Downs, and Reedsburg soils. Atterberry and Reedsburg soils are somewhat poorly drained and are on more level parts of ridgetops. Atterberry soils are silty throughout, and Reedsburg soils formed in deposits similar to those in which Valton soils formed. Downs soils are moderately well drained and are on ridgetops. They are silty throughout. Also included are small areas of soils that are similar to Valton soils but are moderately well drained or have sandstone or limestone between a depth of 40 and 60 inches. Other inclusions are some small pits, some cut and filled areas, and some small areas of Valton soils that have slopes of more than 6 percent. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is moderate in the upper and middle parts of the subsoil and slow in the lower clayey part of the subsoil in this Valton soil. The available water capacity is moderate, and the organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are in woodland. A few other areas are used for unimproved pasture.

This soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Where this soil is cultivated, erosion is a slight or moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and installing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction, which results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use

during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of slow permeability. This limitation can be overcome by constructing a filtering mound of suitable material.

This soil is poorly suited to dwellings with or without basements because of a high shrink-swell potential. For dwellings without basements, shrinking and swelling of the soil with changes in moisture content can be overcome by excavating the soil and replacing it with a coarse material, such as sand or gravel, and by adding lime to the soil. For dwellings with basements, shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material, such as sand or gravel, and by increasing the strength of basement walls. A subsurface drainage system around the dwellings at or below the basement elevation helps keep the soil dry and reduces shrinking and swelling.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of a danger of frost damage. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, and increasing the thickness of pavement.

This soil is in capability subclass IIe and woodland suitability subclass 2o.

VaC2—Valton silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on broad, convex ridgetops. Individual areas of this map unit are long and narrow and range from about 5 to 200 acres in size.

In most cultivated areas, some of the original surface layer has been removed by erosion. The present surface layer is mostly very dark grayish brown silt loam about 9 inches thick that includes some dark yellowish brown silt loam or silty clay loam. The subsoil extends to a depth greater than 60 inches. It is dark yellowish brown silt loam in the upper part, brown silty clay loam in the middle, and yellowish red and strong brown silty clay and clay in the lower part. In some places, the depth to clayey subsoil is as much as 50 inches, and in places, as much as 55 percent of the clayey subsoil is chert. In some areas, strata or small pockets of sandy loam, sandy clay loam, or sandy clay are in the clayey subsoil.

Included with this soil in mapping are small areas of Atterberry, Downs, and Reedsburg soils. Atterberry and Reedsburg soils are somewhat poorly drained and are on concave parts of ridgetops. Atterberry soils are silty throughout, and Reedsburg soils formed in deposits similar to those in which Valton soils formed. Downs soils are moderately well drained and are on ridgetops. They are silty throughout. Also included are areas of severely eroded Wildale soils that have a surface layer of silty clay loam, silty clay, or cherty clay and areas of soils that are similar to Valton soils but are moderately well drained or have sandstone or limestone between a depth of 40 and 60 inches. Other inclusions are some small pits, some cut and filled areas, and some small areas of Valton soils that have slopes of less than 6 percent or more than 12 percent. These inclusions make up from 10 to 15 percent of the map unit.

Permeability is moderate in the upper and middle parts of the subsoil and slow in the lower clayey part of the subsoil in this Valton soil. The available water capacity is moderate, and organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland. A few areas are used for unimproved pasture.

This soil is suited to legumes and grasses for hay and to corn, soybeans, and small grains. In areas where this soil is cultivated, further erosion is a moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and installing diversions and grassed waterways help control erosion and maintain good tilth (fig. 16).

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover and results in further erosion. Grazing when the soil is wet causes surface compaction, which results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, controlled grazing, and restriction on use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. The only soil related limitation to forest management is competing vegetation that interferes with natural regeneration following harvest. This vegetation can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of slow permeability. This limitation can be overcome by constructing a filtering mound of suitable material.

This soil is poorly suited to dwellings with or without basements because of the high shrink-swell potential. For dwellings without basements, shrinking and swelling of the soil with changes in moisture content can be overcome by excavating the soil and replacing it with a coarse material, such as sand or gravel, or by adding

Figure 16.—Contour stripcropping is used to reduce the length of slopes and to help reduce runoff and erosion on the sloping and moderately steep soils of the Valton series.

lime to the soil. For dwellings with basements, shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material, such as sand or gravel, and by increasing the strength of basement walls. A subsurface drainage system around the dwellings at or below the basement level helps keep the soil dry and increases stability.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of a danger of frost damage. These problems can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, and increasing the thickness of pavement.

This soil is in capability subclass IIIe and woodland suitability subclass 2o.

VaD2—Valton silt loam, 12 to 20 percent slopes, eroded. This deep, moderately steep, well drained soil is on convex ridgetops and the upper part of shoulders. Individual areas of this map unit are long and narrow and range from about 10 to 250 acres in size.

In most cultivated areas, some of the original surface layer on the upper side slopes has been removed by erosion. The present surface layer in these areas is mostly dark brown silt loam about 9 inches thick that includes some dark yellowish brown silt loam or silty clay loam. The subsoil extends to a depth greater than 60 inches. It is dark yellowish brown silt loam in the upper

part, brown silty clay loam in the middle, and yellowish red clay in the lower part. In some places, the depth to the clayey subsoil is as great as 50 inches. In some areas, as much as 55 percent of the clayey subsoil is chert. In some areas, strata or small pockets of sandy loam, sandy clay loam, or sandy clay are in the clayey subsoil.

Included with this soil in mapping are small areas of moderately well drained Downs soils on ridgetops. They are silty throughout. Also included are a few severely eroded areas of Wildale soils that have a surface layer of silty clay loam, cherty silty clay loam, or cherty clay. Other inclusions are a few areas of soils that are similar to Valton soils but have sandstone or limestone between a depth of 40 and 60 inches and some areas of Valton soils that have slopes of less than 12 percent or more than 20 percent. Also included are some small pits and some cut and filled areas. These inclusions make up from 10 to 15 percent of the map unit.

Permeability is moderate in the upper and middle parts of the subsoil and slow in the lower clayey part of the subsoil in this Valton soil. The available water capacity is moderate, and the organic matter content of the surface layer is moderately low. Surface water runoff from cultivated areas is rapid. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland. Some areas are used for unimproved pasture.

This soil is poorly suited to cultivated crops, but it is suited to grasses and legumes for hay. Where this soil is used for cultivated crops, further erosion is a severe hazard. Corn, soybeans, and small grains can be safely grown if erosion control practices are used. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, wind and contour stripcropping, planting field windbreaks, and installing diversions and grassed waterways help control water erosion and maintain good tilth.

This soil is suited to pasture. This use is effective in controlling erosion. Overgrazing, however, leads to a loss of plant cover and results in further erosion. Grazing when the soil is wet causes surface compaction, which results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related limitations to forest management are steepness of slope and plant competition following harvest. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival on steeper slopes facing south or west can be improved by care in planting and the use of vigorous planting stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal. Skidding operations may expose sufficient mineral soil to allow adequate regeneration.

This soil is poorly suited to septic tank absorption fields because of slow permeability and slope. Slow permeability can be overcome by constructing a filtering mound of suitable material. Slope can be overcome by cutting, by cutting and filling, or by installing a trench absorption system on the contour.

This soil is poorly suited to dwellings with or without basements because of high shrink-swell potential and because of slope. For dwellings without basements, shrinking and swelling of the soil with changes in moisture can be overcome by excavating the soil and replacing it with a coarse material, such as sand or gravel, and by adding lime to the soil. Slope can be overcome by cutting or cutting and filling to reduce the slope. For dwellings with basements, slope can be overcome by cutting or cutting and filling to reduce the slope, by making dwellings conform to the slope by constructing retaining walls, or by constructing dwellings on existing slope in such a way that the basement floor on one side of a house is at ground level. Shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material, such as sand or gravel, and by increasing the strength of basement walls. Installing a subsurface drainage system around the dwellings at or below the basement elevation keeps the soil dry and reduces shrinking and swelling.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic, because of a potential for frost damage, and because of slope. Low strength and the potential for frost damage can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, and increasing the thickness of pavement. Slope can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass IVe and woodland suitability subclass 2r.

VwE—Valton-Wildale silt loams, 20 to 45 percent slopes. This map unit consists of deep, steep and very steep, well drained soils on upper, slightly convex back slopes and shoulders. Individual areas of this map unit are long and narrow and range from about 3 to 300 acres in size. They are 45 to 55 percent Valton soil and 25 to 35 percent Wildale soil. The areas of Valton soil and the areas of Wildale soil are so intricately mixed, or so small, that it is not practical to separate them at the scale used in mapping.

Typically, the Valton soil has a surface layer of black silt loam about 5 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil to a depth of about 60 inches is strong brown silty clay loam in the upper part and yellowish red cherty clay in the lower part.

Typically, the Wildale soil has a surface layer of very dark grayish brown and dark brown silt loam about 4 inches thick. The subsurface layer is dark brown silt loam about 8 inches thick. The subsoil to a depth of about 60 inches is yellowish red and dark yellowish brown cherty clay. Some areas of this soil are eroded and have a surface layer of brown or reddish brown silty clay loam. In some places, the surface layer and upper part of the subsoil contain as much as 35 percent of chert fragments. In some areas, the clayey subsoil contains more than 35 percent of chert fragments. In some areas, the depth to clayey subsoil is more than 36 inches. In some places, this soil is mottled in the lower subsoil. In some areas, strata or pockets of sandy loam, sandy clay loam, or sandy clay are in the clayey subsoil. In some areas, this soil is less than 60 inches thick over limestone or sandstone. In some places, the slope is less than 20 percent or greater than 45 percent.

Included with this unit in mapping are small areas of Brodale, Dorerton, and Downs soils. The excessively drained Brodale soils and well drained Dorerton soils are on the upper parts of valley slopes. Brodale soils are loamy and underlain by sandstone. Dorerton soils are loamy and are channery in the lower part. The moderately well drained Downs soils are on slightly concave foot slopes and are silty throughout. Also included are areas of severely eroded Valton and Wildale soils in which the surface layer is cherty or flaggy silty clay loam or it is cherty or flaggy clay. Other inclusions are a few areas of Rock outcrop and some areas of soils that are similar to Valton and Wildale soils but have sandstone or limestone between a depth of 40 and 60 inches. Also included are some small pits and some cut and filled areas. These inclusions make up about 15 percent of the map unit.

Permeability is moderate in the upper part of the subsoil and slow in the lower clayey part of the subsoil in these Valton and Wildale soils. The available water capacity and organic matter content of the surface layer are moderate. Surface water runoff from cultivated areas is rapid.

Most areas of these soils are in woodland. Some areas are used for hay and improved pasture, and a few areas are used for cultivated crops. Other areas are used for unimproved pasture.

These soils are generally unsuited to cultivated crops because of the very severe hazard of erosion.

These soils are suited to pasture, and this use is effective in controlling erosion. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when these soils are wet causes surface compaction, which results in poor tilth, increased runoff, and an increased hazard of erosion. On lesser slopes where machinery can be operated, fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

The Valton soil is suited to trees. Soil related limitations to forest management are steepness of slope and plant competition following harvest. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival on steeper slopes facing south or west can be improved by care in planting and use of vigorous planting stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal. Skidding operations may expose sufficient mineral soil to allow adequate regeneration.

The Wildale soil is suited to trees. Soil related limitations to forest management are steepness of slope and seedling survival. Erosion can be minimized by planting trees on the contour and careful placement of skidroads during harvest. The rate of seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

These soils are generally unsuited to septic tank absorption fields and dwellings because of slow permeability, slope, and a high shrink-swell potential. The slope limitation on these soils is especially difficult to overcome, and a different building site should be selected.

The soils are poorly suited to local roads because they do not have sufficient strength to adequately support vehicular traffic and because of slope. Additional problems are a potential for frost damage on the Valton soils and a high shrink-swell potential on the Wildale soils. The low strength of the soil, the hazard of frost damage, the shrinking and swelling of the soil with changes in moisture content can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, and by increasing the thickness of pavement. Slope can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

These soils are in capability subclass VIe. The woodland suitability subclass is 2r for the Valton soil and 3c for the Wildale soil.

Wa—Wautoma sand. This deep, nearly level, poorly drained soil is in depressions and drainageways. It is subject to ponding. Individual areas of this map unit are irregular in shape and range from about 3 to 200 acres in size.

Typically, the surface layer is very dark gray sand about 7 inches thick. The substratum to a depth of about 60 inches is gray, mottled sand and loamy sand in the upper 15 inches over yellowish red, mottled clay, reddish brown, mottled silty clay loam, and silty clay. In some places, the surface layer is loamy sand or mucky sand. In some areas, the substratum is silt loam or the sandy mantle is 40 to 60 inches thick.

Included with this soil in mapping are small areas of Dawson, Menasha, Newson, and Wyeville soils. The very poorly drained Dawson soils are in lower depressions than Wautoma soils. They formed in organic material over sand. The poorly drained Menasha and Newson soils are on landscape positions similar to those of Wautoma soils. Menasha soils have a clayey subsoil and substratum. Newson soils are sandy throughout. The somewhat poorly drained Wyeville soils formed in similar deposits as Wautoma soils but are on higher positions on the landscape. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderately rapid in the sandy mantle and slow or very slow in the lower clayey part of this Wautoma soil. The available water capacity is low, and organic matter content of the surface layer is high. This soil has a seasonal high water table above the surface or within a depth of 1 foot. Surface water runoff is slow or ponded. The surface layer is very friable and easily tilled throughout a wide range in moisture content.

Most areas of this soil are in woodland. A few areas of this soil are drained and used for cultivated crops, hay, and pasture.

This soil is generally unsuited to cultivated crops because it is wet. Drained and cultivated areas of this soil are subject to soil blowing. Also, if the water table is lowered excessively, crop yields during most seasons are limited by low available water capacity.

This soil is poorly suited to pasture because it is saturated near the surface for long periods and has low available water capacity. Where drained, this soil is suited to pasture.

This soil is poorly suited to trees. Trees grow so slowly and form so poorly that trees are barely merchantable at best. Because of soil wetness, seedlings generally must be planted by hand or machine on prepared ridges if natural regeneration is unreliable. Use of vigorous nursery stock is essential to avoid seedling mortality. In many years, harvest is limited to periods when the soil is frozen. Harvesting by clear-cut or area-selection methods helps reduce windthrow of the remaining trees. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is generally unsuited to septic tank absorption fields and dwellings because of ponding and slow or very slow permeability in the substratum. These limitations are difficult to overcome, and a different building site should be selected.

This soil is poorly suited to local roads because it does not have sufficient strength to adequately support vehicular traffic and because of ponding. Low strength can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, and increasing the thickness of pavement. Ponding can be overcome by removing surface water through suitable outlets by use of culverts and ditches or by using fill material to construct roads above the ponding level. Installing culverts also helps prevent road damage by equalizing the water level on both sides of the road.

This soil is in capability subclass VIw, undrained, and woodland suitability subclass 4w.

WdB—Wildale silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on broad, slightly convex ridgetops. Individual areas of this map unit are long and narrow or irregular in shape and range from about 5 to 150 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil to a depth of about 60 inches is dark yellowish brown silty clay loam in the upper part and yellowish red clay in the lower part. In some places, the surface layer is eroded and dark yellowish brown subsoil material has been mixed with the surface layer by plowing. In some places, the surface layer is silty clay loam, and in places, the slope is slightly less than 2 percent.

Included with this soil in the mapping are small areas of Downs and Reedsburg soils. Downs soils are moderately well drained and are on ridgetops and toe slopes. They are silty throughout. Reedsburg soils are somewhat poorly drained and are on lower, concave positions on ridgetops. They formed in deposits similar to those in which Wildale soils formed, but they have a thicker silty mantle. Also included are small pits, some cut and filled areas, and small areas of Wildale soils that have slopes greater than 6 percent. These inclusions make up from 3 to 10 pecent of the map unit.

Permeability is moderate in the upper part of the subsoil and slow in the lower clayey part of the subsoil in this Wildale soil. The available water capacity and organic matter content of the surface layer are moderate. Surface water runoff from cultivated areas is medium. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are in woodland. A few areas are used for unimproved pasture.

This soil is well suited to corn, soybeans, and small grains and to legumes and grasses for hay. Where this soil is cultivated, erosion is a slight or moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting

winter cover crops, and constructing diversions and grassed waterways help control erosion.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The rate of seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of slow permeability. This limitation can be overcome by constructing a filtering mound of suitable material.

This soil is poorly suited to dwellings with or without basements because of a high shrink-swell potential. For dwellings without basements, shrinking and swelling of the soil with changes in moisture content can be overcome by excavating the soil and replacing it with a coarse material, such as sand or gravel, and by adding lime to the soil. For dwellings with basements, shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material, such as sand or gravel, and by increasing the strength of basement walls. A subsurface drainage system around the dwelling at or below the basement elevation helps keep the soil dry and reduces shrinking and swelling.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of the high shrink-swell potential. These limitations can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, and increasing the thickness of pavement.

This soil is in capability subclass IIe and woodland suitability subclass 3c.

WdC2—Wildale cherty silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on broad, convex ridgetops. Individual areas of this map unit are long and narrow and range from about 3 to 200 acres in size.

In most cultivated areas, some of the original surface layer has been removed by erosion. The present surface layer is mostly dark brown cherty silt loam about 7 inches thick that includes varying amounts of dark red cherty clay. The subsoil to a depth of about 60 inches is dark red and reddish brown cherty clay. In some places, strata or small pockets of sandy loam, sandy clay loam, or sandy clay are in the clayey subsoil.

Included with this soil in mapping are small areas of Downs and Reedsburg soils. Downs soils are moderately well drained and are on higher ridgetops and on foot slopes. They are silty throughout. Reedsburg soils are somewhat poorly drained and are on lower concave positions on ridgetops and along drainageways. They formed in similar deposits as Wildale soils but have a thicker silty mantle. Also included are some severely eroded areas of Wildale soils in which the surface layer is mostly yellowish red cherty silty clay loam or cherty clay and some areas of Wildale soils that have slopes of less than 6 percent or more than 12 percent. Other inclusions are small pits and some cut and filled areas. These inclusions make up from 10 to 15 percent of the map unit.

Permeability is moderate in the upper part of the subsoil and slow in the lower clayey part of the subsoil in this Wildale soil. The available water capacity and organic matter content of the surface layer are moderate. Surface water runoff from cultivated areas is rapid. The surface layer is friable and easily tilled, but tilling when the soil is too moist causes compaction and crusting and the formation of clods. The presence of chert fragments in some areas makes tillage difficult.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are in woodland. A few areas are used for unimproved pasture.

This soil is suited to legumes and grasses for hay and to limited amounts of corn, soybeans, and small grains. Where this soil is cultivated, further erosion is a moderate hazard. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is well suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. The rate of seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of slow permeability. This limitation can be overcome by constructing a filtering mound of suitable material.

This soil is poorly suited to dwellings with or without basements because of a high shrink-swell potential. For

dwellings without basements, shrinking and swelling of the soil with changes in moisture can be overcome by excavating the soil and replacing it with a coarse material, such as sand or gravel, or by adding lime to the soil. For dwellings with basements, shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material, such as sand or gravel, and by increasing the strength of basement walls. A subsurface drainage system around the dwelling at or below the basement level helps keep the soil dry and reduces shrinking and swelling.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic and because of the high shrink-swell potential. These limitations can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, and increasing the thickness of pavement.

This soil is in capability subclass IIIe and woodland suitability subclass 3c.

WdD2—Wildale cherty silt loam, 12 to 20 percent slopes, eroded. This deep, moderately steep, well drained soil is on convex ridgetops and the upper parts of shoulders. Individual areas of this map unit are long and narrow and range from about 3 to 150 acres in size.

In most cultivated areas, the original surface layer has been removed by erosion. The present surface layer is dark brown cherty silt loam about 8 inches thick that includes varying amounts of reddish brown cherty clay. The subsoil to a depth of 60 inches is reddish brown and yellowish red cherty clay. In some places, strata or small pockets of sandy loam, sandy clay loam, or sandy clay are in the clayey subsoil.

Included with this soil in mapping are small areas of Brodale, Dorerton, and Downs soils. Brodale soils are somewhat excessively drained, and Dorerton soils are well drained. They are on back slopes. Brodale soils are loamy and are underlain by sandstone. Dorerton soils are loamy and are channery in the lower part. Downs soils are moderately well drained and are on ridgetops and valley slopes. They are silty throughout. Included are some areas of severely eroded Wildale soils in which the surface layer is mostly yellowish red cherty silty clay loam or cherty clay. Also included are some small pits, some cut and filled areas, and some areas of Wildale soils that have slopes of less than 12 percent or more than 20 percent. These inclusions make up from 5 to 15 percent of the map unit.

Permeability is moderate in the upper part of the subsoil and slow in the lower clayey part of the subsoil in this Wildale soil. The available water capacity and organic matter content of the surface layer are moderate. Surface water runoff from cultivated areas is rapid. The surface layer is friable, but the presence of chert fragments and subsoil material in the surface layer makes tillage difficult. Cultivating the soil when it is too moist causes compaction, crusting, and the formation of clods.

Many areas of this soil are used for cultivated crops, hay, and pasture. Many areas are used for unimproved pasture. Some other areas are in woodland.

This soil is poorly suited to cultivated crops, but it is suited to grasses and legumes for hay. Where this soil is used for cultivated crops, further erosion is a severe hazard. Corn, soybeans, and small grains can be safely grown if erosion control practices are used. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, contour farming, contour stripcropping, planting winter cover crops, and constructing diversions and grassed waterways help control erosion and maintain good tilth.

This soil is suited to pasture. Overgrazing, however, leads to a loss of plant cover, resulting in erosion and encouraging the growth of undesirable plants. Grazing when the soil is wet causes surface compaction and results in poor tilth, increased runoff, and an increased hazard of erosion. Fertilization, liming, renovation, controlled grazing, and restriction on use during wet periods help to keep the soil and plant cover in good condition.

This soil is suited to trees. Erosion can be controlled by planting trees on the contour and by careful placement of skidroads during harvest. The survival rate of planted trees can be increased by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of slow permeability and slope. Slow permeability can be overcome by constructing a filtering mound of suitable material. Slope can be overcome by cutting, by cutting and filling, or by installing a trench absorption system on the contour.

This soil is poorly suited to dwellings with or without basements because of a high shrink-swell potential and because of slope. For dwellings without basements, shrinking and swelling of the soil with changes in moisture content can be overcome by excavating the soil and replacing it with a coarse material, such as sand or gravel, or by adding lime to the soil. Slope can be overcome by cutting or cutting and filling to reduce the slope. For dwellings with basements, slope can be overcome by cutting or cutting and filling to reduce the slope, by making dwellings conform to the slope by constructing retaining walls, or by constructing dwellings on existing slope in such a way that the basement floor on one side of house is at ground level. Shrinking and swelling can be overcome by removing the soil around and below the basement excavation and replacing it with a coarse material, such as sand or gravel, and by

increasing the strength of basement walls. Installing a subsurface drainage system around the dwellings at or below the basement level keeps the soil dry and reduces shrinking and swelling.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic, because of the high shrink-swell potential, and because of slope. Low strength and shrinking and swelling can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, and increasing the thickness of pavement. Slope can be overcome by cutting and filling to shape the roadway or by building the road in an area of less slope.

This soil is in capability subclass IVe and woodland suitability subclass 3c.

WeA—Wyeville loamy sand, 0 to 3 percent slopes. This deep, nearly level and gently sloping, somewhat poorly drained soil is on broad plane and slightly convex slopes. Individual areas of this unit are irregular in shape and range from about 10 to 800 acres in size.

Typically, the surface layer is very dark grayish brown loamy sand about 9 inches thick. The subsurface layer is dark brown sand about 18 inches thick that is mottled in the lower part. The subsoil is reddish brown, mottled silty clay about 19 inches thick. The substratum to a depth of about 60 inches is reddish brown, mottled silty clay. In some places, the surface layer is sand.

Included with this soil in mapping are small areas of Meehan and Wautoma soils. Meehan soils are somewhat poorly drained and are on similar positions on the landscape. They are sandy throughout. Wautoma soils formed in similar deposits but are poorly drained and are on lower positions on the landscape. These inclusions make up from 2 to 15 percent of the map unit.

Permeability is moderately rapid in the sandy mantle and slow or very slow in the clayey subsoil and substratum in this Wyeville soil. The available water capacity and organic matter content of the surface layer are low. This soil has a seasonal high water table at a depth of 1 foot to 3 feet. Surface water runoff is slow. The surface layer is very friable and easily tilled over a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Many areas are in woodland.

This soil is suited to corn, soybeans, and small grains and to legumes and grasses for hay. In most areas of this soil, drainage is not needed for crop production because the water table is not high enough in late spring to adversely affect tillage and planting. Surface drainage ditches and land grading are used in some areas of this soil to remove excess surface water more rapidly. After the water table drops, crop yields are limited by low available water capacity unless the soil is irrigated. Sprinkler irrigation works well on this soil. Because of the moderately rapid permeability in the sandy upper part of this soil, irrigation rates should be limited to prevent leaching of plant nutrients out of the root zone. Water erosion is generally not a hazard, but cultivated areas are subject to soil blowing. Proper management of crop residue, use of a conservation tillage system, such as chisel planting, that leaves a protective amount of crop residue on the soil surface, wind stripcropping, and planting field windbreaks and winter cover crops help control soil blowing.

This soil is suited to pasture, but it is saturated near the surface during wet periods. If drained, it is droughty and yields are limited by the low available water capacity.

This soil is suited to trees. The rate of seedling survival can be improved by careful planting of vigorous nursery stock. Competing vegetation that interferes with natural regeneration following harvest can be controlled by suitable herbicides or mechanical removal.

This soil is poorly suited to septic tank absorption fields because of wetness and slow or very slow permeability in the clayey subsoil and substratum. These limitations can be overcome by constructing a filtering mound of suitable material. It may also be possible to pump the effluent to an absorption field on higher, more suitable soils.

This soil is poorly suited to dwellings with or without basements because of wetness. For dwellings without basements; wetness can be overcome by installing a subsurface drainage system that has a gravity outlet or other dependable outlet, and by filling the site to raise its level. For dwellings with a basement, wetness can be overcome by constructing the basement above the level of wetness and by installing a subsurface drainage system that has a gravity outlet or other dependable outlet.

This soil is poorly suited to local roads and streets because it does not have sufficient strength to adequately support vehicular traffic. This limitation can be overcome by replacing the upper part of the soil with a coarse base material, such as sand or gravel, and increasing the thickness of pavement.

This soil is in capability subclass IIIw and woodland suitability subclass 2s.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. It is of major importance in providing the Nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited and the U. S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the use of our Nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce a sustained high yield of crops when it is treated and managed using acceptable farming methods. Prime farmland produces the highest yields with minimum inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland may now be in crops, pasture, woodland, or other land, but not urban and built-up land or water areas. It must either be used for producing food or fiber or be available for these uses.

Prime farmland usually has an adequate and dependable supply of moisture from precipitation or irrigation. It also has favorable temperature and growing season and acceptable acidity or alkalinity. It has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

About 98,440 acres, or about 16.8 percent of Monroe County, meets the soil requirements for prime farmland. Areas are scattered throughout the county, but most are in the southern and western parts, mainly in map units 1, 2, and 3 of the general soil map. Nearly all of this prime farmland is used for crops, mainly corn, hay, and oats.

Soil map units that make up prime farmland in Monroe County are shown in table 4. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 3. The location is shown on the detailed soil maps in the back of this publication. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units".

Some map units meet the requirements for prime farmland only in areas where the soil is drained or protected from flooding. In table 4 a qualification is added in parentheses after the name of these map units. Onsite evaluation is needed to determine whether or not these problems have been overcome.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the suitability and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock or wetness can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 258,000 acres in Monroe County was used for crops and pasture in 1967, according to the Wisconsin Conservation Needs Inventory (*11*) and 1980 Wisconsin Agriculture Statistics (*14*). Of this total, about 70,000 acres was used for permanent pasture; 56,000 acres for cultivated crops, mainly corn; 18,000 acres for small grain, mainly oats; 82,000 acres for rotational hay and pasture; and 2,000 acres for fruit crops. The rest was mostly idle cropland.

The potential of the soils in Monroe County for increased production of food is good. About 17,000 acres of potentially good cropland is currently used for woodland and about 23,000 acres is in pasture. Food production could also be increased considerably by extending the latest crop production technology to all cropland in the county.

Soil erosion by water and wind is the major soil problem on about 76 percent of the cropland and pasture in Monroe County. If the slope is more than 2 percent, water erosion is a hazard. The coarser textured soils and organic soils are especially susceptible to soil blowing.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plowed layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Wildale soils, and on soils such as Norden, which are moderately deep to bedrock. Erosion also reduces productivity on soils that tend to be droughty, such as Billett, Eleva, and Urne soils. Second, soil eroded by water enters streams as sediment. Control of erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

Erosion control practices provide protective surface cover, reduce runoff, and increase infiltration. A cropping system that keeps vegetative cover on the soil for extended periods can hold soil losses to amounts that do not reduce the productive capacity of the soils. On dairy farms, which require pasture and hay, including

Figure 17.—Contouring and contour stripcropping on the Downs, Valton, and Wildale soils. These practices, together with grassed waterways, are commonly used to control erosion in Monroe County.

legume and grass forage crops in the cropping system reduces erosion on sloping land, provides nitrogen, and improves tilth for other crops grown in rotation.

Conservation tillage, which leaves crop residue on the surface, helps to increase infiltration and reduces the hazards of runoff and erosion. Conservation tillage can be adapted to most soils in the survey area, but are more difficult to use successfully on eroded soils.

Terraces and diversions reduce the length of slope and reduce runoff and erosion. Contouring and contour stripcropping retard runoff and reduce erosion. Most of the soils in Monroe County have smooth, uniform slopes and are well suited to these practices (fig. 17).

Soil blowing is a hazard on the sandy Au Gres, Boone, Impact, Meehan, Newson, Tarr, and Wyeville soils and on the organic Dawson, Houghton, Loxley, and Palms soils. It is also a hazard on the Billett, Eleva, Hoopeston, and Wautoma soils. Soil blowing can damage these soils in a few hours if winds are strong and the soils are dry and bare of vegetation or surface mulch. Maintaining vegetative cover, surface mulch, and field windbreaks minimize soil blowing on these soils.

Information for the design of erosion control practices for each kind of soil is contained in the Technical Guide at the local offices of the Soil Conservation Service.

Soil drainage is a major management need on about 14 percent of the acreage used for crops and pasture in the survey area. Some soils are naturally so wet that the production of crops common to the area is generally not possible unless the soils are drained. These naturally wet soils are the poorly drained Ettrick, Kato, Lows, Menasha, Newson, and Wautoma soils and the organic, very poorly drained Dawson, Houghton, Loxley, and Palms soils.

Unless artificially drained, the somewhat poorly drained soils are so wet that crops are damaged or tillage or harvest is delayed during most years. In this category are the Atterberry, Au Gres, Boaz, Ceresco,

Coffeen, Curran, Dells, Hoopeston, Meehan, Reedsburg, Shiffer, and Wyeville soils.

A combination of surface drainage and subsurface drainage is needed in most areas of the poorly drained and very poorly drained soils used for intensive row cropping. The design of surface and subsurface drainage systems varies according to the kind of soil and the site conditions. Diversions are needed in some areas to divert runoff from adjacent slopes.

If organic soils are drained and used for cropland, special management practices are necessary. Organic soils oxidize and subside when the pore space is filled with air; therefore, special drainage systems are needed to control the depth and the period of drainage. Keeping the water table at the level required by crops during the growing season and raising it to the surface during other parts of the year minimize the oxidation and subsidence of organic soils.

The poorly drained and very poorly drained soils are low lying, and crops grown on most areas of these soils are subject to frost damage. There are fewer frost-free growing days per season in these areas than on adjacent uplands because of cold-air drainage.

Information on drainage design for each kind of soil is contained in the Technical Guide at the local offices of the Soil Conservation Service.

Soil fertility is quite variable in Monroe County, depending on each soil's past cropping history. Nearly all of the soils are naturally acid in the surface layer and upper part of the subsoil. If they have never been limed, they require applications of ground limestone to raise the pH level sufficiently to produce alfalfa and other crops that grow best where reaction is nearly neutral. In general, coarse and moderately coarse textured soils require less lime than do medium textured soils. Available potassium levels are naturally low in many soils of the survey area. On all soils, additions of lime and fertilizer should be based on the results of soil tests, on the needs of the crops grown, and on the expected yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply.

Soil tilth is an important factor in the germination of seeds and emergence of seedlings. It is also important in the infiltration of water into the soil. Soils that have good tilth are granular and porous. Tilling or grazing when the soil is too wet can cause poor soil tilth, especially on soils that have a surface layer of loam or silt loam. Intense rainfall on bare soil can cause the formation of a surface crust that reduces infiltration and increases runoff and erosion. Good soil tilth is more difficult to maintain on eroded soils because they have a lower content of organic matter. Returning crop residue to the soil and regularly adding manure or other organic material to the soil help improve soil structure and tilth of the surface layer.

Field crops suited to the soils and climate of the survey area include many that are not commonly grown. Corn is the common row crop, but the acreage of soybeans is increasing. Sunflowers, sweet corn, sugar beets, and peas can be grown if economic conditions are favorable. Oats is the most common close-grown crop. Wheat, rye, barley, and buckwheat can be grown; and grass seed can be produced from bromegrass, fescue, and bluegrass.

Pastures in the county can be separated into two types: rotation pasture and permanent pasture.

Rotation pastures are areas that are used for cultivated crops in some years and for pasture in one or more years as part of the cropping system. They generally consist of a grass-legume mixture. Permanent pastures are in perennial legumes and grasses or in grasses. This kind of pasture remains unplowed for many years and generally is on the steeper slopes.

Management practices are similar for both types of pasture. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricting use during wet periods help to keep the soil and the pasture plants in good condition. Renovating permanent pasture by planting higher yielding pasture plants, such as bromegrass and birdsfoot trefoil, is desirable if erosion can be controlled. On wet soils, artificial drainage is needed to increase the number and yields of suitable pasture plants. Reed canarygrass is about the only species grown on undrained, wet soils.

Special crops grown commercially in the survey area are vegetables, such as sweet corn and peas; fruit, such as apples, cranberries, and strawberries; and tobacco (fig. 18). A small acreage is used for tomatoes, melons, raspberries, squash, and many other vegetables.

Many of the soils in the survey area that have good natural drainage are suited to a wide variety of vegetables and small fruits. Information and suggestions for growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered (*4*).

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting

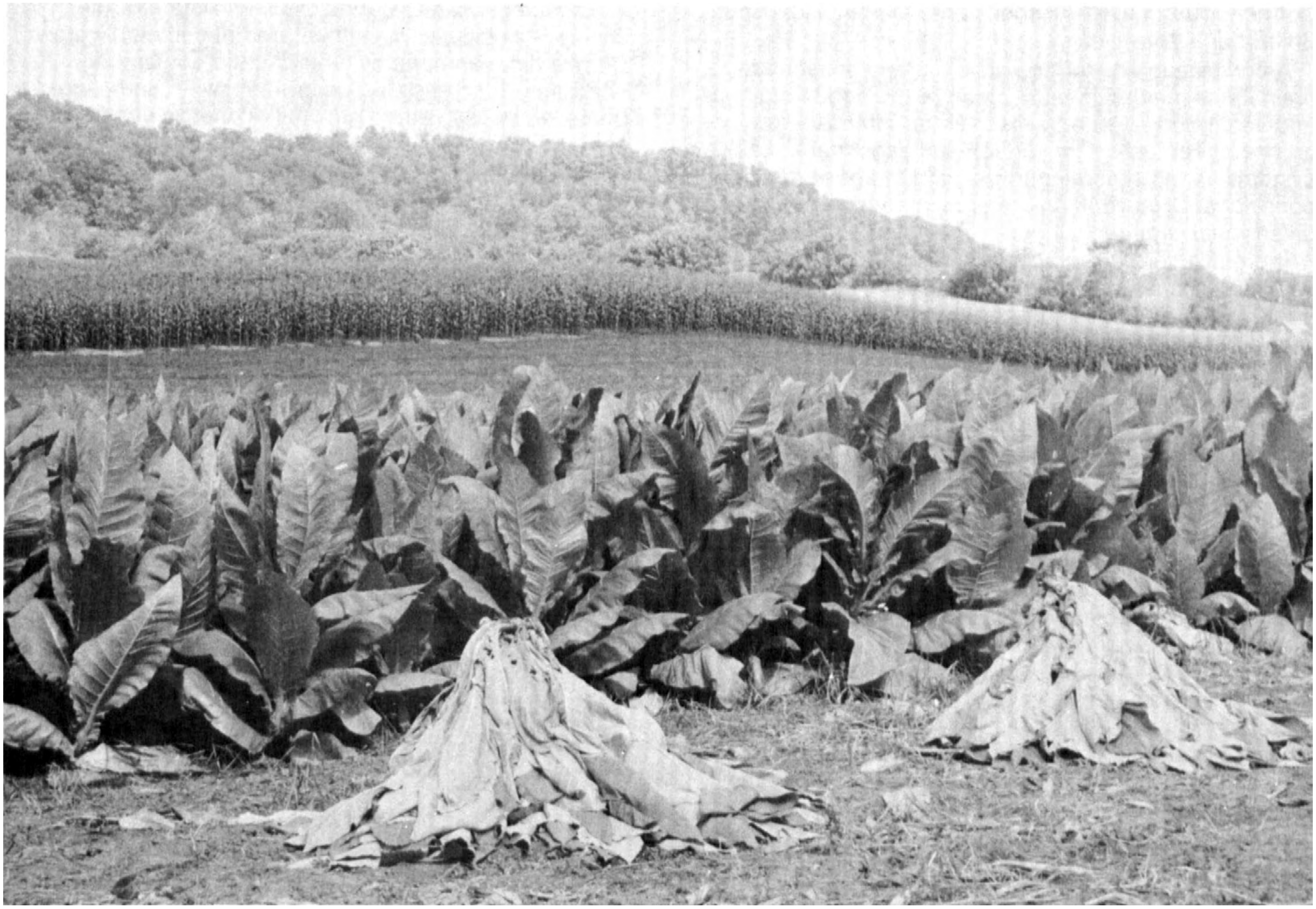


Figure 18.—Tobacco being grown on soils of the Downs series. Tobacco is an important crop for some farmers in Monroe County.

and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (*10*). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soil do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Woodland Management and Productivity

George W. Alley, forester, Soil Conservation Service, assisted in preparing this section.

Open park-like forests of oak or pine trees intermingled with prairie vegetation once covered much of Monroe County. In the northern part of the county, the trees were mostly white pine and jack pine. In the southern part, oaks dominated the stand. At present, about 218,500 acres, or 37 percent, of the county is considered commercial forest. Of that, about 53 percent is oak-hickory type, 32 percent consists of other hardwoods, and 10 percent consists of conifers, and 5 percent is nonstocked (*15*).

About 77 percent of the forest land is owned by farmers and other private owners. About 15 percent is federally owned, mostly in the Fort McCoy Military Reservation, and about 8 percent is state or county owned land.

The oak forest in map units 1 and 2, described in the section "General Soil Map Units," is the most important commercial forest area in the county. Northern pin oak and pines are common on the sandy soils in map units 3 and 4. The forest in map unit 5 is predominantly coniferous species that tolerate the wet sandy soils of the area.

By far, the most important species of the oak forests is northern red oak. White oak, aspen, basswood, and sugar maple are also important. In the northern pin oak and pine forests, jack pine and white pine are commercially important. The northern pin oak is rarely merchantable (fig. 19).

Grazing of woodland by domestic livestock is a continuing problem. The acreage of woodland grazed is decreasing, however, mainly because of better management of livestock and forage.

Forests could be considerably improved by removing defective trees and eliminating undesirable species. Fire is seldom a problem because of effective suppression, and insect and disease problems are not generally of primary importance.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w* excessive water in or on the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: w, s, f, and r.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or

Figure 19.—Northern pin oak growing on Tarr sand. This is a common species on sandy and droughty soils. The trees are mostly small and poorly formed.

special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that few trees may be blown down by strong winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Additional information about woodland management and productivity can be obtained from the Wisconsin Department of Natural Resources forester, the local office of the Soil Conservation Service, or the Cooperative Extension Service.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To insure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service, the Wisconsin Department of Natural Resources, or the Cooperative Extension Service or from a nursery.

Recreation

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Steve F. Baima, biologist, Soil Conservation Service, assisted in preparing this section.

The essential habitat elements of a selected species of wildlife are generally dependent on several kinds of soil and a combination of land uses. The diversity of land uses in Monroe County results in numerous habitat types, enabling the county to support an abundant and

varied fish and wildlife community. Based on land use and soil type, Monroe County has been divided into two main wildlife areas.

The first is the northern and particularly the northeastern quarter of Monroe County, or the area covered by the Newson-Dawson-Meehan general soil map unit and the Wyeville-Wautoma-Newson general soil map unit. The soils in these map units are largely sandy and organic and range from somewhat poorly drained to very poorly drained. The main wildlife practice on these soils is clearcutting small areas of aspen. This fosters aspen regeneration and provides habitat for species that inhabit the forests and forest edges. Wildlife of special importance in this area include white-tailed deer, ruffed grouse, furbearers, and numerous nongame forest species.

Although ground water is abundant in northeastern Monroe County, the natural ability of most tributary streams to produce food organisms is quite low. Most streams are classified as forage fish streams, except for the east and north forks of the Lemonweir River, which support northern pike, walleye, panfish, and bass. Trout streams are not abundant.

The flowages support several large heron rookeries. To a limited extent, mallards, wood ducks, blue-winged teal, coots, and a few Canada geese use the flowages for brood rearing.

The other major soil area important for wildlife is the northwestern one-quarter and the southern one-half of the county. These are the areas covered by the Valton-Downs-Wildale map unit, the Norden-Urne-La Farge map unit, the Tarr-Boone-Impact map unit, and the Billett-Impact map unit. Large areas of these soils are derived from weathered sandstone and limestone.

The soil and water are generally productive in these areas. In the more intensely farmed southern half of the county, a key management practice is fencing to exclude livestock from woodlots and streams. Wildlife of special importance include white-tailed deer, ruffed grouse, grey squirrel, fox squirrel, and bobwhite quail.

Trout streams and forage fish streams alike are generally more productive in these areas than northeastern streams. A few pheasants inhabit the southern half of the county, but the entire county is considered poor to marginal pheasant range. The rough terrain in the southern half of the county is considered fair or secondary wild turkey range.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, switchgrass, goldenrod, beggarweed, tickclover, and ragweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, aspen, poplar, cherry, maple

basswood, apple, hawthorn, dogwood, hickory, and blackberry.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local

roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, stone content, soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, the available water capacity in the upper 40 inches, and the content of salts affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of

compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to

the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment (fig. 20). Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding;

Figure 20.—Pond reservoir in an area of Kickapoo soils. The dam, or embankment, in the background is constructed of soil from the surrounding uplands.

slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the depth of the root zone, the amount of salts, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of water erosion or soil blowing, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 18.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 18.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility of soil to soil blowing and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.
3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.
4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.
5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.
6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.
7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.
8. Stony or gravelly soils and other soils not subject to soil blowing.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

In table 17, some soils are assigned to two hydrologic groups. The first letter is for drained areas, and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt are not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 17 shows the expected total subsidence, which usually is a result of drainage and the oxidation that follows.

Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 18 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the Wisconsin Department of Transportation, Division of Highways and Transportation Facilities.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*12*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquoll (*Aqu*, meaning water, plus *oll*, from Mollisol.

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquolls (*Hapl*, meaning minimal horizonation, plus *aquolls*, the suborder of the Mollisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is very-fine, mixed, mesic Typic Haplaquolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*9*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*12*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Abscota Series

The Abscota series consists of deep, moderately well drained, rapidly permeable soils on flood plains. These soils formed in sandy alluvium. Slope ranges from 0 to 3 percent.

Abscota soils are similar to Impact and Tarr soils and are commonly adjacent to Dells, Impact, Kato, and Tarr soils on the landscape. Dells soils are somewhat poorly drained and have more silt and clay in the solum. Impact and Tarr soils are on stream terraces and valley slopes and are not subject to flooding. Also, Impact soils have

an umbric epipedon. Kato soils are poorly drained and have more silt and clay in the solum.

Typical pedon of Abscota loamy sand, 0 to 3 percent slopes, approximately 1,020 feet west and 3,300 feet north of the southeast corner of sec. 10, T. 19 N., R. 5 W.

A1—0 to 5 inches; very dark grayish brown (10YR 3/2) loamy sand, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; common fine and very fine roots; medium acid; clear wavy boundary.

C1—5 to 33 inches; brown (10YR 4/3) sand; single grain; loose; slightly acid; clear wavy boundary.

C2—33 to 60 inches; brown (10YR 5/3) sand; few fine prominent yellowish brown (10YR 5/8) mottles; single grain; loose; slightly acid.

Reaction is slightly acid or medium acid throughout the pedon. Pebbles make up 0 to 3 percent of the volume of the A horizon and of the C horizon.

The A horizon has a value of 3 or 4 and chroma of 1 or 2. The C horizon has value of 4 or 5 and chroma of 3 to 6. It is sand or loamy sand.

Atterberry Series

The Atterberry series consists of deep, somewhat poorly drained, moderately permeable soils on ridgetops. These soils formed in loess. Slope ranges from 0 to 6 percent.

Atterberry soils are similar to Reedsburg soils and are commonly adjacent to Downs, Reedsburg, and Valton soils on the landscape. Downs soils are moderately well drained. Reedsburg soils and Valton soils are clayey in the lower part of the B horizon, and Valton soils are well drained.

Typical pedon of Atterberry silt loam, 0 to 2 percent slopes, approximately 520 feet east and 20 feet north of the southwest corner of sec. 13, T. 16 N., R. 2 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; very friable; many fine and very fine roots; neutral; abrupt smooth boundary.

A2—9 to 15 inches; pale brown (10YR 6/3) silt loam; common coarse faint grayish brown (10YR 5/2) and common coarse distinct dark brown (7.5YR 4/4) mottles; moderate fine subangular blocky structure; friable; few very fine roots; neutral; clear smooth boundary.

B2t—15 to 28 inches; brown (10YR 5/3) silty clay loam; few coarse faint grayish brown (10YR 5/2) and few coarse prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; thin continuous grayish brown (2.5Y 5/2) clay films on faces of peds; common very fine roots; medium acid; gradual smooth boundary.

B3tg—28 to 44 inches; grayish brown (10YR 5/2) silt loam; common coarse prominent strong brown (7.5YR 5/6) mottles; moderate coarse subangular blocky structure; friable; thin patchy brown (10YR 5/3) clay films on faces of peds; medium acid; gradual smooth boundary.

C—44 to 60 inches; grayish brown (2.5Y 5/2) silt loam; many coarse prominent strong brown (7.5YR 5/6) mottles; massive; friable; some tendency to part along horizontal cleavage planes; medium acid.

Solum thickness ranges from 30 to 60 inches. Reaction is medium acid or strongly acid in the B2t horizon and ranges from medium acid to neutral in the C horizon.

The Ap, or A1, horizon has value of 2 or 3 and chroma of 1 to 2. The B2t horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 or 4. It is silty clay loam or silt loam. The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4.

Au Gres Series

The Au Gres series consists of deep, somewhat poorly drained, rapidly permeable soils on lake basins. These soils formed in sandy deposits. Slope ranges from 0 to 3 percent. These soils have siliceous mineralogy rather than mixed mineralogy as defined for the series, but this difference does not alter their use and behavior.

Au Gres soils are similar to Meehan soils and are mapped as an undifferentiated group with Meehan soils. They are commonly adjacent to Dawson, Meehan, Newson, and Tarr soils on the landscape. Dawson soils are very poorly drained organic soils. Meehan soils do not have diagnostic horizons. Newson soils are poorly drained. Tarr soils are moderately well drained and excessively drained.

Typical pedon of Au Gres sand from an area of Meehan and Au Gres sands, 0 to 3 percent slopes, approximately 2,540 feet west and 2,300 feet south of the northeast corner of sec. 1, T. 19 N., R. 1 E.

01—1 inch to 0; very dark brown (10YR 2/2) leaf litter, consisting of pine needles and oak leaves; strongly acid; abrupt smooth boundary.

A1—0 to 4 inches; black (10YR 2/1) sand, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; many very fine and fine roots; strongly acid; abrupt wavy boundary.

A2—4 to 16 inches; dark grayish brown (10YR 4/2) sand; few medium faint brown (7.5YR 5/2) mottles; weak medium subangular blocky structure; very friable; strongly acid; clear wavy boundary.

B2hir—16 to 20 inches; dark reddish brown (5YR 2/2) sand; weak medium subangular blocky structure;

friable; discontinuous weakly cemented ortstein; medium acid; abrupt wavy boundary.

B3—20 to 26 inches; strong brown (7.5YR 5/6) sand; common fine distinct yellowish red (5YR 4/8) mottles; weak coarse subangular blocky structure; very friable; medium acid; clear wavy boundary.

C1—26 to 48 inches; light yellowish brown (10YR 6/4) sand; common fine prominent strong brown (7.5YR 5/8) mottles; single grain; loose; medium acid; clear wavy boundary.

C2—48 to 60 inches; light gray (10YR 7/2) sand; common fine prominent reddish yellow (7.5YR 6/6) mottles; single grain; loose; medium acid.

Solum thickness ranges from 20 to 36 inches. Reaction ranges from strongly acid to slightly acid throughout the pedon.

The A1 horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 or 2. The A2 horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 1 or 2. The B2hir horizon has hue of 5YR, 7.5YR, or 10YR, value of 2 to 4, and chroma of 2 to 3. Where present, the B2ir horizon has hue of 5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 3 or 4. The C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 1 to 6.

Bertrand Series

The Bertrand series consists of deep, well drained soils that are moderately permeable in the solum and rapidly permeable in the substratum. These soils are on stream terraces and valley slopes. They formed in loess or other silty deposits and in the underlying sandy deposits. Slope ranges from 2 to 12 percent.

Bertrand soils are similar to Downs and Jackson soils and are commonly adjacent to Downs, Jackson, and Meridian soils on the landscape. Downs soils are silty to a depth of 60 inches and are moderately well drained. Jackson soils are moderately well drained. Meridian soils have more sand and less silt throughout.

Typical pedon of Bertrand silt loam, 2 to 6 percent slopes, approximately 1,500 feet west and 2,100 feet south of the northeast corner of sec. 31, T. 19 N., R. 1 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; friable; common very fine and fine roots; neutral; abrupt smooth boundary.

B1—10 to 16 inches; yellowish brown (10YR 5/4) silt loam; weak moderate subangular blocky structure; friable; common very fine roots; neutral; clear wavy boundary.

B21t—16 to 23 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; common very fine roots; thin continuous clay films on faces of peds; slightly acid; clear wavy boundary.

B22t—23 to 34 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; few very fine roots; thin patchy clay films on vertical faces of peds; medium acid; clear wavy boundary.

B31t—34 to 42 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; few very fine roots; thin patchy clay films on vertical faces of peds; medium acid; clear wavy boundary.

IIB32t—42 to 50 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; friable; thin patchy clay films on vertical faces of peds; medium acid; abrupt smooth boundary.

IIC—50 to 60 inches; yellowish brown (10YR 5/8) fine sand; single grain; loose; strongly acid.

Solum thickness and depth to underlying sand range from 45 to 60 inches. Reaction ranges from medium acid to neutral in the A horizon and from strongly acid to slightly acid in the B horizon and C horizon.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. Some pedons have an A2 horizon. The B horizon is silt loam or silty clay loam and has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The IIB horizon is loam, sandy loam, or loamy sand and has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The IIC horizon has hue of 10YR or 7.5YR, value of 4 to 8, and chroma of 2 to 8. It is fine sand or medium sand. In some pedons, the sand has lamellae or thin textural bands and contrasting colors that are derived from the underlying parent material.

Billett Series

The Billett series consists of deep, well drained and moderately well drained soils on valley slopes and stream terraces. These soils formed in loamy deposits overlying sandy deposits. Permeability is moderately rapid in the subsoil and rapid in the substratum. Slope ranges from 0 to 20 percent.

Billett soils are similar to Meridian soils and are commonly adjacent to Eleva, Hoopeston, Impact, Meridian, and Tarr soils on the landscape. Eleva soils are moderately deep over sandstone bedrock. Hoopeston soils are somewhat poorly drained and have a thicker dark surface layer. Impact and Tarr soils are sandy throughout. Meridian soils are well drained and have more silt and clay in the upper part of the solum.

Typical pedon of Billett sandy loam, 2 to 6 percent slopes, approximately 100 feet north and 240 feet east of the southwest corner of sec. 19, T. 17 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; weak very fine granular structure; friable; many very fine roots; neutral; abrupt smooth boundary.

B21t—9 to 22 inches; dark yellowish brown (10YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; few very fine roots; few clay films on faces of peds; slightly acid; clear wavy boundary.

B22t—22 to 32 inches; dark yellowish brown (10YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; few very fine roots; some clay bridging between sand grains; medium acid; clear wavy boundary.

C—32 to 60 inches; brownish yellow (10YR 6/8) sand; single grain; loose; slightly acid.

Solum thickness ranges from about 30 to 40 inches. Coarse fragments, mainly pebbles, make up 0 to 12 percent of the solum and 0 to 20 percent of that of the substratum. Reaction ranges from strongly acid to neutral throughout the solum.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 to 3. The B2t horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. Some pedons have a B3 horizon which is sandy loam or loamy sand. In some pedons, bands of cherty pebbles are in the B horizon. The C horizon has hue of 10YR or 7.5YR and value and chroma of 4 to 8. In some pedons, the substratum has mottles that have value and chroma of 2 to 8. It is sand or loamy sand. In some pedons, thin lamellae or color bands are in the C horizon.

Boaz Series

The Boaz series consists of deep, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slope ranges from 0 to 3 percent.

Boaz soils are similar to Coffeen soils and are commonly adjacent to Coffeen, Curran, Dells, Ettrick, and Kato soils on the landscape. Coffeen soils are stratified. Curran soils have more sand in the C horizon. Dells soils have more sand in the B horizon and C horizon. Ettrick soils are poorly drained. Kato soils are poorly drained and have more sand in the C horizon.

Typical pedon of Boaz silt loam, 0 to 3 percent slopes, approximately 220 feet south and 700 feet west of the northeast corner of sec. 21, T. 16 N., R. 2 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak medium granular structure; friable; many very fine roots; neutral; abrupt smooth boundary.

B1g—9 to 13 inches; dark grayish brown (10YR 4/2) silt loam; many medium prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; common very fine roots; many coarse black (10YR 2/1) wormcasts; neutral; clear wavy boundary.

B21—13 to 16 inches; brown (10YR 5/3) silt loam; many medium prominent yellowish brown (10YR 5/8) mottles; moderate fine subangular blocky structure; friable; few very fine roots; many coarse black (10YR 2/1) wormcasts; neutral; clear wavy boundary.

B22g—16 to 35 inches; grayish brown (10YR 5/2) silt loam; many medium prominent strong brown (7.5YR 5/8) and yellowish red (5YR 4/8) mottles; moderate medium subangular blocky structure; friable; few very fine roots; neutral; clear wavy boundary.

C—35 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; few medium prominent yellowish brown (10YR 5/8) mottles; massive; friable; neutral.

Solum thickness ranges from 25 to 40 inches. Reaction ranges from medium acid to neutral throughout the pedon.

The A horizon has value of 2 or 3 and chroma of 1 to 3. The B2g horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 3. It is silt loam or silty clay loam. The C horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam or silty clay loam. In some pedons, it contains thin lenses of silty clay, silt, or very fine sand.

Boone Series

The Boone series consists of moderately deep, excessively drained, rapidly permeable soils on ridgetops and valley slopes. These soils formed in sandy residuum of sandstone. Slope ranges from 6 to 70 percent.

Boone soils are commonly adjacent to Eleva, Gale, Norden, Tarr, and Urne soils on the landscape. Eleva and Urne soils have more silt and clay in the solum and are somewhat excessively drained. Gale and Norden soils have more silt and clay in the solum and are well drained. Tarr soils are more than 60 inches deep over bedrock.

Typical pedon of Boone sand, 12 to 45 percent slopes, approximately 2,100 feet north and 780 feet west of the southeast corner of sec. 4, T. 18 N., R. 3 W.

O1—1 inch to 0; partially decomposed leaf litter.

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) sand, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; many fine and very fine roots; strongly acid; clear wavy boundary.

C1—2 to 12 inches; strong brown (7.5YR 5/6) sand; single grain; loose; about 5 percent pebbles; few very fine roots; slightly acid; gradual wavy boundary.

C2—12 to 22 inches; yellowish brown (10YR 5/6) sand; single grain; loose; about 5 percent pebbles; few fine roots; slightly acid; abrupt smooth boundary.

Cr—22 to 60 inches; very pale brown (10YR 8/3) weakly consolidated sandstone.

Weakly consolidated sandstone bedrock is at a depth of 20 to 40 inches. Reaction ranges from slightly acid to strongly acid throughout the pedon.

The A horizon has value of 3 or 4 and chroma of 1 to 3. The C horizon has hue of 10YR or 7.5YR, value of 4 to 8, and chroma of 1 to 6. The sand ranges from fine to coarse. In most places, the underlying sandstone is weakly consolidated, but in some places, it contains layers that are strongly consolidated.

Brodale Series

The Brodale series consists of deep, excessively drained, moderately permeable soils on upper parts of valley slopes. These soils formed in loamy colluvium and residuum of limestone or calcareous sandstone bedrock. Slope ranges from 45 to 80 percent.

Brodale soils are commonly adjacent to Dorerton, Norden, Urne, Valton, and Wildale soils on the landscape. Dorerton soils are deeper than 60 inches over bedrock and do not have carbonates in the surface layer. Norden soils have more silt and clay throughout, are well drained, and have fewer rock fragments. Urne soils are somewhat excessively drained and have fewer fragments. Valton soils are more than 60 inches deep over bedrock. Also, they are clayey in the lower part of the B horizon and are well drained. Wildale soils are more than 60 inches deep over bedrock. They are mostly clayey throughout and are well drained.

Typical pedon of Brodale flaggy very fine sandy loam, 45 to 80 percent slopes, approximately 400 feet west and 2,440 feet north of the southeast corner of sec. 8, T. 16 N., R. 4 W.

A11—0 to 10 inches; very dark brown (10YR 2/2) flaggy very fine sandy loam, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; very friable; about 35 percent flagstones; common very fine and fine roots and a few medium and coarse roots; strong effervescence; moderately alkaline; clear wavy boundary.

A12—10 to 14 inches; very dark grayish brown (10YR 3/2) very flaggy very fine sandy loam, brown (10YR 4/3) dry; moderate fine subangular blocky structure; very friable; about 65 percent flagstones; common very fine and fine roots and a few medium and coarse roots; strong effervescence; moderately alkaline; gradual wavy boundary.

B21—14 to 19 inches; brown (10YR 4/3) very flaggy very fine sandy loam; moderate fine subangular blocky structure; very friable; about 65 percent flagstones; few very fine and fine roots; few medium very dark grayish brown (10YR 3/2) wormcasts; violent effervescence; moderately alkaline; clear wavy boundary.

B22—19 to 27 inches; dark yellowish brown (10YR 4/4) very flaggy very fine sandy loam; moderate fine subangular blocky structure; very friable; about 65 percent flagstones; few very fine and fine roots; few medium very dark grayish brown (10YR 3/2) wormcasts; violent effervescence; moderately alkaline; clear wavy boundary.

C—27 to 42 inches; yellowish brown (10YR 5/4) very flaggy very fine sandy loam; weak medium subangular blocky structure; very friable; about 55 percent flagstones; violent effervescence; moderately alkaline; clear wavy boundary.

R—42 inches; light yellowish brown (10YR 6/4) calcareous sandstone.

Solum thickness ranges from 16 to 28 inches, and depth to limestone or calcareous sandstone bedrock ranges from 40 to 60 inches. The content of coarse fragments of sandstone and limestone ranges from 35 to 75 percent in the A1 horizon and from 40 to 75 percent in the B horizon and C horizon. The coarse fragments range from pebbles to cobblestones and flagstones. Reaction is mildly alkaline or moderately alkaline throughout the pedon.

The A1 horizon has value of 2 to 3 and chroma of 1 or 2. The B2 horizons have value of 3 to 5 and chroma of 3 or 4. They are flaggy or very flaggy sandy loam, fine sandy loam, or very fine sandy loam. Some pedons have a Cr horizon. It is calcareous sandstone or limestone.

Ceresco Series

The Ceresco series consists of deep, somewhat poorly drained, moderately permeable or moderately rapidly permeable soils on narrow flood plains. These soils formed in loamy and sandy alluvium. Slope ranges from 0 to 3 percent.

Ceresco soils are similar to Kickapoo soils and are commonly adjacent to Coffeen, Council, and Kickapoo soils on the landscape. Coffeen soils have more silt and less sand throughout. Council soils are well drained and have more silt and clay throughout. Kickapoo soils are moderately well drained.

Typical pedon of Ceresco fine sandy loam, 0 to 3 percent slopes, approximately 2,400 feet south and 1,800 feet east of the northwest corner of sec. 13, T. 15 N., R. 3 W.

A11—0 to 11 inches; very dark brown (10YR 2/2) fine sandy loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; very friable; few very fine roots; mildly alkaline; abrupt smooth boundary.

A12—11 to 14 inches; very dark grayish brown (10YR 3/2) loamy fine sand, brown (10YR 5/3) dry; weak medium granular structure; very friable; few fine roots; mildly alkaline; abrupt smooth boundary.

B1—14 to 20 inches; brown (10YR 4/3) loamy fine sand; few fine faint grayish brown (10YR 5/2) and brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; very friable; slightly acid; gradual irregular boundary.

B21g—20 to 24 inches; dark grayish brown (10YR 4/2) fine sandy loam; many coarse distinct brown (7.5YR 4/4) mottles; moderate coarse subangular blocky structure; friable; slightly acid; clear wavy boundary.

B22g—24 to 36 inches; grayish brown (10YR 5/2) fine sandy loam; many coarse distinct brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; very friable; neutral; abrupt smooth boundary.

C—36 to 60 inches; grayish brown (10YR 5/2) silt loam; common coarse distinct reddish brown (5YR 4/4) mottles; massive; friable; neutral.

Solum thickness ranges from 18 to 42 inches. Reaction ranges from slightly acid to mildly alkaline to a depth of about 24 inches and from neutral to moderately alkaline below this depth.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The B2g horizon has value of 4 or 5. It is sandy loam, fine sandy loam, or loam. The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is sandy loam or silt loam and has strata of sand and loamy sand in some pedons.

Coffeen Series

The Coffeen series consists of deep, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slope ranges from 0 to 3 percent.

Coffeen soils are similar to Boaz soils and are commonly adjacent to Boaz, Ceresco, and Ettrick soils on the landscape. Boaz soils have a thinner dark surface layer and contain more clay in the subsoil. Ceresco soils have more sand and less silt throughout. Ettrick soils are poorly drained.

Typical pedon of Coffeen silt loam, 0 to 3 percent slopes, approximately 660 feet north and 1,475 feet west of the southeast corner of sec. 5, T. 17 N., R. 4 W.

Ap—0 to 9 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; very friable; many very fine roots; slightly acid; abrupt smooth boundary.

A12—9 to 13 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak coarse subangular blocky structure; friable; many fine roots; slightly acid; abrupt wavy boundary.

B1g—13 to 22 inches; dark grayish brown (10YR 4/2) silt loam; many fine distinct dark brown (7.5YR 4/4) mottles; moderate coarse subangular blocky structure; friable; many fine roots; medium acid; clear wavy boundary.

B2g—22 to 28 inches; light brownish gray (10YR 6/2) silt loam; many medium prominent strong brown (7.5YR 5/8) mottles; moderate coarse subangular blocky structure; very friable; common fine roots; neutral; clear wavy boundary.

B3g—28 to 34 inches; light brownish gray (10YR 6/2) silt loam that has strata of very fine sandy loam; many medium prominent strong brown (7.5YR 5/8) mottles; weak thick platy structure; very friable; medium acid; clear smooth boundary.

C1—34 to 42 inches; dark yellowish brown (10YR 4/4) silt loam; many medium distinct light brownish gray (10YR 6/2) and common fine faint strong brown (7.5YR 4/4) mottles; massive; tendency to part along horizontal cleavage lines; friable; slightly acid; clear smooth boundary.

C2—42 to 60 inches; dark yellowish brown (10YR 4/4) silt loam; many medium and coarse distinct grayish brown (10YR 5/2) and common medium prominent strong brown (7.5YR 5/8) mottles; massive; friable; some tendency to part along horizontal cleavage planes; slightly acid.

Solum thickness ranges from 24 to 50 inches. Reaction ranges from medium acid to neutral throughout the solum.

The A horizon has value of 2 or 3 and chroma of 1 or 2, and it ranges from 10 to 24 inches in thickness. The B horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or 3. It is silt loam or silty clay loam and, in most pedons, contains stratified fine sand, very fine sandy loam, or loam.

The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 7, and chroma of 1 to 3. Strata of silt or fine sand are in some pedons, and some pedons have an Ab horizon.

Council Series

The Council series consists of deep, well drained, moderately permeable soils on valley slopes. These soils formed in loamy and silty deposits. Slope ranges from 2 to 30 percent.

Council soils are commonly adjacent to Ceresco, Downs, Kickapoo, La Farge, Norden, and Urne soils on the landscape. Ceresco soils are somewhat poorly drained. Downs soils have more silt and less sand throughout and are moderately well drained. Kickapoo soils are stratified and are moderately well drained. La Farge, Norden, and Urne soils are moderately deep and underlain by weakly consolidated glauconitic sandstone. Also, La Farge soils have more silt and less sand in the solum, and Urne soils have more sand.

Typical pedon of Council silt loam, 12 to 20 percent slopes, approximately 1,320 feet east and 1,600 feet south of the northwest corner of sec. 31, T. 18 N., R. 4 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak fine and medium granular structure with some weak fine and medium subangular blocky and some weak medium platy in

the lower part; friable; common very fine roots; a few very fine and fine root pores; numerous flecks of yellowish brown (10YR 5/4 and 10YR 5/6); slightly acid; abrupt smooth boundary.

B21t—8 to 16 inches; brown (10YR 4/3) loam; weak thick and very thick platy structure; friable; about 2 percent pebbles; thin patchy brown (7.5YR 4/2) clay films on faces of peds; few light gray (10YR 7/2) uncoated silt grains on vertical faces of peds; few black (N 2/0) iron and manganese segregations on faces of peds; few very fine roots; few very fine pores with an occasional fine pore; medium acid; gradual smooth boundary.

B22t—16 to 24 inches; brown (7.5YR 5/4) loam; weak thick and very thick platy structure; friable; thin patchy brown (7.5YR 4/4) clay films on faces of peds; about 2 percent pebbles; few black (N 2/0) iron and manganese segregations on faces of peds and in pores; few very fine roots; few very fine pores; medium acid; gradual smooth boundary.

B23t—24 to 32 inches; yellowish brown (10YR 5/4) loam; weak coarse prismatic structure parting to weak thick and very thick platy; friable; thin patchy brown (7.5YR 4/4) clay films on horizontal and vertical faces of peds; thick pale yellow (2.5Y 7/4) uncoated sand grains on a few vertical faces of peds; about 1 percent pebbles; few very fine roots; common very fine pores; medium acid; gradual smooth boundary.

B3—32 to 52 inches; yellowish brown (10YR 5/4) loam; weak coarse prismatic structure parting to weak very thick platy; friable; thin patchy brown (7.5YR 4/4) clay films and light gray (10YR 7/2) uncoated silt grains and some medium and coarse uncoated sand grains mainly on vertical faces of peds; about 2 percent pebbles; very fine roots concentrated mainly on faces of peds; common very fine pores; medium acid; clear smooth boundary.

C—52 to 60 inches; yellowish brown (10YR 5/6) silt loam; weak coarse prismatic structure; friable; thin strata of light brownish gray (10YR 6/2); light gray (10YR 7/2) uncoated silt grains and a few medium and coarse uncoated sand grains common on vertical faces of peds; a few dark yellowish brown (10YR 4/4) clay flows in root channels and pores; about 1 percent pebbles; common very fine roots concentrated mainly on faces of peds; common very fine and a few fine pores; medium acid.

Solum thickness ranges from 32 to 70 inches. Reaction ranges from very strongly acid to neutral in the solum and is medium acid or slightly acid in the C horizon. Coarse fragments, mainly sandstone pebbles, make up 0 to 15 percent of the solum and of the C horizon.

The Ap horizon has value of 3 or 4 and chroma of 2 to 4. Where present, the A1 horizon has value of 2 or 3 and chroma of 1 or 2. Some pedons have an A2 horizon, a B1 horizon, or both. The B2t horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. It is loam or silt loam. The B3 horizon is similar in color and texture to the B2t horizon. The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. It is loam or silt loam.

Curran Series

The Curran series consists of deep, somewhat poorly drained soils that are moderately permeable in the solum and rapidly permeable in the substratum. These soils are on low stream terraces. They formed in loess or other silty deposits and in the underlying water-laid sandy deposits. Slope ranges from 0 to 3 percent.

Curran soils are similar to Boaz soils and are commonly adjacent to Boaz, Coffeen, Dells, Ettrick, and Kato soils on the landscape. Boaz soils have more silt in the C horizon. Coffeen soils have a thicker dark surface layer and have less clay in the B horizon. Dells soils have more sand and less silt in the C horizon. Ettrick and Kato soils are poorly drained. Kato soils have more sand and less silt in the C horizon.

Typical pedon of Curran silt loam, 0 to 3 percent slopes, approximately 520 feet east and 1,260 feet south of the northwest corner of sec. 7, T. 17 N., R. 1 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; friable; many very fine roots; neutral; abrupt smooth boundary.

A2—9 to 13 inches; brown (10YR 5/3) silt loam; common medium faint dark brown (7.5YR 4/4) mottles; weak thick platy structure; friable; few very fine roots; neutral; clear wavy boundary.

B21tg—13 to 21 inches; light brownish gray (10YR 6/2) silt loam; many medium prominent yellowish red (5YR 5/6) mottles; moderate fine subangular blocky structure; friable; common discontinuous clay films on faces of peds; slightly acid; clear wavy boundary.

B22tg—21 to 36 inches; light brownish gray (10YR 6/2) silt loam; many medium prominent yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; friable; many continuous clay films on faces of peds; slightly acid; clear wavy boundary.

B3g—36 to 50 inches; grayish brown (2.5Y 5/2) silt loam; many fine prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; medium acid; abrupt wavy boundary.

IIC—50 to 60 inches; dark yellowish brown (10YR 4/4) loamy sand; single grain; loose; slightly acid.

Solum thickness ranges from 45 to 60 inches. The thickness of the silty deposit ranges from 40 to 50 inches. Reaction ranges from neutral to medium acid in

the A horizon and from slightly acid to strongly acid in the B horizon and C horizon.

The Ap, or A1, horizon has value and chroma of 1 to 3. The Bt horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 2 or 3. It is silt loam or silty clay loam. The IIC horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 2 to 6. It is sand or loamy sand.

Dawson Series

The Dawson series consists of deep, very poorly drained soils on flood plains or lake basins. These soils, which have moderately rapid permeability, formed in organic materials underlain by sandy deposits. Slope ranges from 0 to 2 percent.

Dawson soils are similar to Palms soils and are commonly adjacent to Au Gres, Houghton, Loxley, and Newson soils on the landscape. Au Gres soils are somewhat poorly drained and are sandy throughout. Houghton and Loxley soils are very poorly drained and formed in organic material more than 51 inches thick. Newson soils are poorly drained and are sandy throughout. Palms soils are organic soils underlain by loamy deposits.

Typical pedon of Dawson peat, approximately 1,040 feet east and 600 feet south of the northwest corner of sec. 14, T. 19 N., R. 1 E.

Oi1—0 to 10 inches; dark yellowish brown (10YR 4/4) broken face and rubbed fibric material; about 95 percent fiber, 90 percent rubbed; massive; fibers are primarily sphagnum moss; extremely acid (pH 4.0, Truog method); abrupt smooth boundary.

Oi2—10 to 12 inches; dark brown (7.5YR 3/2) broken face and rubbed fibric material; about 90 percent fiber, 80 percent rubbed; massive; fibers are primarily sphagnum moss; extremely acid (pH 4.0, Truog method); clear wavy boundary.

Oa1—12 to 42 inches; black (10YR 2/1) broken face and rubbed sapric material; about 15 percent fiber, 5 percent rubbed; massive; primarily herbaceous fibers; extremely acid (pH 4.0, Truog method); gradual wavy boundary.

IIC—42 to 60 inches; pale brown (10YR 6/3) sand; single grain; loose; extremely acid.

The thickness of the organic layers and depth to the IIC horizon range from 16 to 51 inches. Reaction is extremely acid or very strongly acid in the C horizon.

The surface tier has hue of 10YR or 7.5YR, value of 3 to 6, and chroma of 2 to 4. Fiber content ranges from 75 to 95 percent. Subsurface tiers and bottom tiers have hue of 10YR, 7.5YR, or 5YR, value of 2 to 4, and chroma of 1 to 3. The materials are dominantly sapric, but layers of fibric material totaling less than 5 inches in thickness and hemic material totaling less than 10 inches are in some pedons. The IIC horizon has hue of 2.5Y, 10YR, or 7.5YR, value of 4 to 6, and chroma of 1 to 3.

Dells Series

The Dells series consists of deep, somewhat poorly drained soils that are moderately permeable in the solum and rapidly permeable in the substratum. These soils are on stream terraces. They formed in thin loess or silty deposits over loamy deposits underlain by sandy deposits. Slope ranges from 0 to 3 percent.

Dells soils are commonly adjacent to Boaz, Curran, Ettrick, Kato, and Shiffer soils on the landscape. Boaz, Curran, and Ettrick soils have more silt and less sand in the C horizon. Also, Ettrick and Kato soils are poorly drained. Shiffer soils have more sand and less silt in the solum.

Typical pedon of Dells silt loam, 0 to 3 percent slopes, approximately 2,000 feet east and 2,000 feet south of the northwest corner of sec. 4, T. 16 N., R. 3 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; friable; few very fine roots; neutral; abrupt smooth boundary.

B1—9 to 13 inches; brown (7.5YR 5/4) silt loam; common fine prominent strong brown (7.5YR 5/8) and common fine distinct light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; common very fine roots; neutral; clear smooth boundary.

B2t—13 to 31 inches; brown (10YR 5/3) silt loam; common fine prominent yellowish red (5YR 5/8) and few fine faint light brownish gray (10YR 6/2) mottles; moderate fine subangular blocky structure; friable; few thin clay films on faces of peds; common very fine roots; neutral; clear smooth boundary.

IIB3g—31 to 33 inches; grayish brown (10YR 5/2) loam; common fine prominent yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; friable; very few thin clay films on faces of peds; many very fine roots; neutral; abrupt smooth boundary.

IIC—33 to 60 inches; light gray (10YR 7/2) sand; common fine prominent reddish yellow (7.5YR 6/8) mottles; single grain; loose; few thin discontinuous strata of light brownish gray (2.5Y 6/2) silt loam; neutral.

Solum thickness ranges from 20 to 36 inches. Reaction ranges from strongly acid to neutral in the solum. The entire solum below the A horizon has few to many low- and high-chroma mottles.

The Ap, or A1, horizon has value of 2 or 3 and chroma of 1 or 2. Some pedons have an A2 horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 5. It is silt loam or silty clay loam. The

IIB3 horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. It is sandy loam or loam. The IIC horizon has hue of 10YR or 7.5YR, value of 4 to 8, and chroma of 2 to 4. It is loamy sand or sand stratified with thin layers of sandy loam, loam, or silt loam. Some pedons do not have the stratification.

Dorerton Series

The Dorerton series consists of deep, well drained, moderately permeable soils on side slopes of uplands. These soils formed in loess and in the underlying loamy erosional deposits containing a high percentage of channery fragments. Slope ranges from 20 to 45 percent.

Dorerton soils are similar to Brodale soils and are commonly adjacent to Brodale, Norden, Urne, Valton, and Wildale soils on the landscape. Brodale soils are underlain by limestone or calcareous sandstone at a depth of 40 to 60 inches. Norden and Urne soils have fewer rock fragments and are moderately deep over weakly consolidated glauconitic sandstone. Valton soils are clayey in the lower part of the B horizon. Wildale soils are mostly clayey throughout.

Typical pedon of Dorerton silt loam, in an area of Norden, Urne, and Dorerton soils, 20 to 45 percent slopes, approximately 1,600 feet west and 2,100 feet south of the northeast corner of sec. 30, T. 15 N., R. 4 W.

A1—0 to 4 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; strong fine granular structure; friable; many very fine and fine roots; mildly alkaline; clear wavy boundary.

A2—4 to 12 inches; brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; friable; common very fine to coarse roots; slightly acid; clear wavy boundary.

B21t—12 to 21 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; friable; few thin clay films on faces of peds and in pores; common very fine to coarse roots; medium acid; clear wavy boundary.

IIB22t—21 to 27 inches; dark brown (7.5YR 4/4) channery clay loam; moderate medium subangular blocky structure; firm; common moderately thick clay films on faces of peds and in pores; about 40 percent channery fragments; common very fine to coarse roots; slightly acid; clear wavy boundary.

IIC1—27 to 56 inches; dark yellowish brown (10YR 4/4) very channery loam; weak medium subangular blocky structure; friable; about 70 percent channery fragments; slight effervescence; moderately alkaline; clear wavy boundary.

IIC2—56 to 60 inches; yellowish brown (10YR 5/4) very channery fine sandy loam; weak medium subangular blocky structure; very friable; about 70 percent channery fragments; slight effervescence; moderately alkaline.

Solum thickness ranges from 24 to 45 inches. Reaction is slightly acid or neutral in the solum and neutral to moderately alkaline in the C horizon.

The A1 horizon has value of 2 or 3 and chroma of 1 or 2. The A2 horizon has value of 3 to 5 and chroma of 2 or 3. The B horizon has value and chroma of 3 or 4. It is loam, silt loam, or clay loam. The IIB horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is channery or very channery loam or clay loam. The IIC horizon has value of 4 or 5 and chroma of 3 or 4. It is channery or very channery fine sand, loamy sand, fine sandy loam, or loam.

Downs Series

The Downs series consists of deep, moderately well drained, moderately permeable soils on ridgetops, valley slopes, and high stream terraces. These soils formed in loess or other silty deposits. Slope ranges from 0 to 20 percent.

Downs soils are similar to Jackson soils and are commonly adjacent to Atterberry, Gale, Jackson, La Farge, and Valton soils on the landscape. Atterberry soils are somewhat poorly drained. Gale and La Farge soils are moderately deep to weathered sandstone and are well drained. Jackson soils are underlain by sand at a depth of 40 to 60 inches. Valton soils are clayey in the lower part of the B horizon and are well drained.

Typical pedon of Downs silt loam, 2 to 6 percent slopes, approximately 1,500 feet south and 890 feet west of the northeast corner of sec. 15, T. 15 N., R. 3 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; very friable; many fine roots; neutral; abrupt smooth boundary.

B1—9 to 17 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; many fine roots; slightly acid; clear wavy boundary.

B2t—17 to 29 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; few fine roots; thin continuous clay films on faces of peds and in root channels; medium acid; clear wavy boundary.

B3—29 to 40 inches; yellowish brown (10YR 5/4) silt loam; many medium distinct yellowish red (5YR 4/6) and common medium faint pale brown (10YR 6/3) mottles; moderate coarse subangular blocky structure; friable; few fine roots; few patchy light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

C—40 to 60 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct yellowish red (5YR 4/6) and many medium distinct light brown (10YR 6/2) mottles; weak medium platy structure; friable; strongly acid.

Solum thickness ranges from 30 to more than 60 inches. Reaction ranges from mildly alkaline to strongly acid throughout the pedon.

The A horizon ranges from 6 to 9 inches in thickness and has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon. The B2t horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam. The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 8.

Eleva Series

The Eleva series consists of moderately deep, somewhat excessively drained soils that are moderately permeable or moderately rapidly permeable. These soils are on ridgetops and valley slopes and formed in loamy residuum of sandstone. Slope ranges from 6 to 45 percent.

Eleva soils are similar to Urne soils and are commonly adjacent to Billett, Boone, Council, Gale, and Urne soils on the landscape. Billett and Council soils are more than 60 inches deep over bedrock. Boone soils are sandy throughout. Gale soils have more silt and clay in the solum. Urne soils have a cambic B horizon and are underlain by weakly consolidated glauconitic sandstone.

Typical pedon of Eleva sandy loam, 20 to 45 percent slopes, approximately 1,850 feet south and 1,600 feet east of the northwest corner of sec. 16, T. 18 N., R. 2 W.

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) sandy loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; many very fine roots; strongly acid; abrupt smooth boundary.

B1—2 to 6 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium subangular blocky structure; very friable; common very fine and few medium roots; strongly acid; clear wavy boundary.

B21t—6 to 18 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; friable; few very fine roots; thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—18 to 28 inches; dark yellowish brown (10YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; medium acid; gradual wavy boundary.

Cr—28 to 60 inches; brownish yellow (10YR 6/6) weakly consolidated sandstone, but becomes harder as depth increases; abrupt smooth boundary.

Solum thickness and depth to sandstone bedrock range from 20 to 40 inches. Reaction ranges from slightly acid to strongy acid throughout the solum.

The A1, or Ap, horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. Some pedons have an A2 horizon. The B1 horizon has value and chroma of 4 or 5. It is sandy loam or fine sandy loam. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 5. It is sandy loam, fine sandy loam, or loam. The C horizon, where present, is loose sand and has value of 5 to 7 and chroma of 4 to 6.

Ettrick Series

The Ettrick series consists of deep, poorly drained, moderately slowly permeable soils on flood plains and low stream terraces. These soils formed in silty alluvium. Slope ranges from 0 to 2 percent.

Ettrick soils are similar to Kato soils and are commonly adjacent to Boaz, Coffeen, Houghton, Kato, and Palms soils on the landscape. Boaz and Coffeen soils are somewhat poorly drained, and Coffeen soils are stratified. Kato soils have a sandy C horizon. Houghton and Palms soils are organic soils.

Typical pedon of Ettrick silt loam, approximately 170 feet north and 1,640 feet west of the southeast corner of sec. 33, T. 15 N., R. 2 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; weak medium granular and weak fine subangular blocky structure; friable; common very fine roots; neutral; abrupt smooth boundary.

A12—10 to 16 inches; black (N 2/0) silt loam, dark gray (10YR 4/1) dry; moderate medium granular and moderate very fine and fine subangular blocky structure; friable; about 1 percent soft, black (10YR 2/1) iron and manganese accumulations; a few splotches of grayish brown (10YR 5/2); few very fine roots and very fine and fine pores; neutral; clear smooth boundary.

B21g—16 to 20 inches; dark gray (5Y 4/1) silt loam; few fine prominent brown (7.5YR 4/4) mottles; weak medium and coarse subangular blocky structure; friable; about 1 percent soft black (10YR 2/1) iron and manganese accumulations; many root channels coated with black (10YR 2/1) material; few fine roots; few very fine pores; neutral; clear smooth boundary.

B22g—20 to 26 inches; gray (5Y 5/1) silt loam; common fine prominent strong brown (7.5YR 5/6) mottles; weak medium and coarse subangular blocky structure; friable; about 1 percent soft black (10YR 2/1) and some strong brown (7.5YR 5/6) iron and manganese accumulations; few very fine roots and few fine pores; krotovinas filled with black (10YR 2/1) silt loam; neutral; clear smooth boundary.

B31—26 to 31 inches; mixed gray (5Y 5/1) and yellowish red (5YR 4/6) silt loam; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; about 5 percent yellowish red (5YR 4/6) segregated iron as pipestems, some are strong brown (7.5YR 5/6); few very fine roots; neutral; gradual smooth boundary.

B32g—31 to 35 inches; gray (5Y 5/1) silt loam; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; reddish brown (5Y 4/4) radiates from old root channels for a distance of 1/8 inch; a few iron concretions and a few tubular concretions; common very fine and few fine roots; neutral; abrupt smooth boundary.

C2—35 to 60 inches; gray (N 5/0) silt loam; massive; friable; common fine and very fine roots; mildly alkaline.

Solum thickness ranges from 30 to 48 inches. Reaction ranges from slightly acid to moderately alkaline throughout the pedon.

The A horizon ranges from 10 to 18 inches in thickness. It is neutral or has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The B2 horizon is neutral or has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam or silty clay loam. The C horizon is neutral or has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2. It is silt loam, but thin strata of fine sand, loamy fine sand, or fine sandy loam, are in some pedons.

Gale Series

The Gale series consists of moderately deep, well drained soils that are moderately permeable in the upper part and moderately rapidly or rapidly permeable in the lower part. These soils are on ridgetops and valley slopes. They formed in loess and in the underlying sand weathered from sandstone. Slope ranges from 6 to 20 percent.

Gale soils are similar to La Farge soils and are commonly adjacent to Boone, Eleva, Downs, La Farge, and Meridian soils on the landscape. Boone soils are shallower to sandstone bedrock and are sandy. Eleva soils have more sand and less clay. Downs soils are more than 60 inches deep over bedrock and are moderately well drained. Meridian soils are more than 60 inches deep over bedrock and have more sand and less silt in the solum. La Farge soils are underlain by weakly consolidated glauconitic sandstone.

Typical pedon of Gale silt loam, 6 to 12 percent slopes, approximately 1,640 feet east and 900 feet north of the southwest corner of sec. 36, T. 17 N., R. 1 E.

Ap—0 to 7 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many very fine to coarse roots; neutral; abrupt smooth boundary.

B1—7 to 15 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; friable; common very fine to coarse roots; neutral; clear wavy boundary.

B2t—15 to 29 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; friable; thin discontinuous clay films on faces of peds; few very fine to medium roots; very strongly acid; abrupt wavy boundary.

IIB3—29 to 33 inches; dark brown (7.5YR 4/4) sandy loam; weak moderate subangular blocky structure; friable; very strongly acid; clear wavy boundary.

IIC—33 to 39 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; medium acid; clear wavy boundary.

Cr—39 to 60 inches; light yellowish brown (10YR 6/4); weakly consolidated sandstone, but tends to become harder as depth increases.

Solum thickness ranges from 20 to 38 inches, and the depth to sandstone bedrock ranges from 20 to 40 inches. Reaction ranges from neutral to very strongly acid in the solum and is medium acid or slightly acid in the sand substratum.

The Ap, or A1, horizon has value of 3 or 4 and chroma of 2 or 3. Some pedons have an A2 horizon. The B2t horizon has value of 4 or 5 and chroma of 3 to 5. It is silt loam or silty clay loam. The IIB3 horizon formed in a mixture of loess and sandy residuum or entirely in the sandy residuum of the underlying sandstone. It has hue of 10YR or 7.5YR and value and chroma of 4 to 6. It is sandy loam, loam, or loamy fine sand. In the IIC horizon, colors are intermediate between those of the IIB3 horizon and sandstone. This horizon is loamy sand or sand, and in a few pedons, it contains a few fragments of sandstone.

Hoopeston Series

The Hoopeston series consists of deep, somewhat poorly drained, moderately rapidly permeable soils on stream terraces. These soils formed in loamy and sandy deposits overlying sand or loamy sand. Slope ranges from 0 to 3 percent. These soils contain more sand than defined for the series, but this difference does not significantly alter their use and behavior.

Hoopeston soils are similar to Shiffer soils, and are commonly adjacent to Au Gres, Billett, Kato, Meridian, Newson, and Shiffer soils on the landscape. Au Gres and Newson soils are sandy, and Newson soils are poorly drained. Billett soils are well drained and moderately well drained. Kato soils are poorly drained and have more silt and clay in the solum. Meridian soils are well drained and have more silt and clay in the solum. Shiffer soils have an argillic horizon and more silt and clay in the solum.

Typical pedon of Hoopeston sandy loam, 0 to 3 percent slopes, approximately 1,220 feet east and 360 feet south of northwest corner of sec. 9, T. 17 N., R. 1 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many roots; neutral; abrupt smooth boundary.

B21—10 to 15 inches; brown (10YR 4/3) sandy loam; common fine faint dark grayish brown (10YR 4/2) and common fine prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; slightly acid; gradual wavy boundary.

B22g—15 to 24 inches; grayish brown (10YR 5/2) loamy sand; many medium prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; strongly acid; clear smooth boundary.

C—24 to 60 inches; light gray (10YR 7/2) sand; many medium prominent yellowish brown (10YR 5/8) mottles; single grain; loose; strongly acid.

Solum thickness ranges from 20 to 30 inches. Reaction ranges from neutral to strongly acid in the solum, and it is medium acid or strongly acid in the C horizon.

The Ap, or A1, horizon has value of 2 or 3 and chroma of 1 to 3. The B2 horizon has value of 4 to 6 and chroma of 1 to 4. The C horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 6. It typically is loamy sand or sand. Strata of gravel or sandy loam are in some pedons.

Houghton Series

The Houghton series consists of deep, very poorly drained, moderately rapidly permeable soils on lake basins and flood plains. These soils formed in organic material. Slope ranges from 0 to 2 percent.

Houghton soils are similar to Loxley soils and are commonly adjacent to Boaz, Ceresco, Dawson, Ettrick, and Palms soils on the landscape. Boaz, Ettrick, and Ceresco soils are mineral soils. Dawson, Loxley, and Palms soils are organic soils. Dawson soils have a sandy C horizon. Loxley soils have a pH of less than 5.0 (in water), and Palms soils have a loamy C horizon.

Typical pedon of Houghton muck, approximately 1,320 feet west and 2,420 feet south of the northeast corner of sec. 35, T. 15 N., R. 3 W.

Oa1—0 to 42 inches; very dark brown (10YR 2/2) broken face and rubbed sapric material; about 30 percent fiber, 5 percent rubbed; weak thick platy structure; herbaceous fiber; many very fine roots to 15 inches and few very fine roots from 15 to 42 inches; neutral (pH 6.8, Truog method); clear smooth boundary.

Oa2—42 to 53 inches; black (10YR 2/1) broken face and rubbed sapric material; about 20 percent fiber, 5 percent rubbed; weak coarse subangular blocky structure; herbaceous fiber; neutral (pH 7.3, Truog method); abrupt smooth boundary.

Oa3—53 to 60 inches; very dark grayish brown (10YR 3/2) broken face and rubbed sapric material; about 40 percent fiber, 10 percent rubbed; weak thick platy structure; herbaceous fiber; slightly acid; (pH 6.3, Truog method).

The organic layers are more than 51 inches thick. Reaction ranges from medium acid to neutral throughout the pedon.

The organic layers are neutral or have hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 to 3. Some pedons contain layers of fibric or hemic material. Hemic materials have a combined thickness of less than 10 inches, and fibric materials have a combined thickness of less than 5 inches. Some pedons contain woody fragments, ranging from about 1 inch to 8 inches in diameter, that cannot be crushed between the fingers.

Impact Series

The Impact series consists of deep, excessively drained and moderately well drained, rapidly permeable soils on stream terraces and broad, low valley slopes. These soils formed in sandy deposits weathered from sandstone. Slope ranges from 0 to 6 percent.

Impact soils are similar to Tarr soils and are commonly adjacent to Au Gres, Billett, Hoopeston, Meehan, and Tarr soils on the landscape. Au Gres and Meehan soils are somewhat poorly drained. Billett soils have more silt and clay in the solum. Hoopeston soils are somewhat poorly drained and have more silt and clay in the solum. Tarr soils have an ochric epipedon.

Typical pedon of Impact sand, 2 to 6 percent slopes, approximately 520 feet east and 1,770 feet south of the northwest corner of sec. 19, T. 17 N., R. 2 W.

Ap—0 to 8 inches; black (10YR 2/1) sand, brown (7.5YR 5/2) dry; weak medium subangular blocky structure; very friable; many very fine and medium and a few coarse roots; strongly acid; abrupt smooth boundary.

A12—8 to 12 inches; very dark grayish brown (10YR 3/2) sand, brown (10YR 5/3) dry; weak coarse subangular blocky structure; very friable; many very fine and medium roots; strongly acid; clear smooth boundary.

A3—12 to 15 inches; dark brown (10YR 3/3) sand; weak moderate subangular blocky structure; very friable; common fine and medium roots; strongly acid; clear smooth boundary.

B2—15 to 36 inches; dark yellowish brown (10YR 4/4) sand; weak moderate subangular blocky structure; very friable; strongly acid; abrupt smooth boundary.
C—36 to 60 inches; very pale brown (10YR 7/4) sand; single grain; loose; slightly acid.

Solum thickness ranges from 24 to 42 inches. Reaction ranges from slightly acid to strongly acid throughout the pedon.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 to 3. It ranges from 10 to 24 inches in thickness and is sand, fine sand, loamy sand, or loamy fine sand. The B horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. It is mottled in the lower part of some pedons. It is sand, fine sand, loamy sand, or loamy fine sand.

The C horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 to 7, and chroma of 1 to 8. It is mottled in some pedons. It is sand or fine sand. Some pedons have lamellae, or thin textural bands and contrasting colors, derived from the underlying parent material.

Jackson Series

The Jackson series consists of deep, moderately well drained soils that are moderately permeable in the solum and rapidly permeable in the substratum. These soils are on stream terraces and low valley slopes. They formed in loess or other silty deposits and in the underlying sandy deposits. Slope ranges from 0 to 6 percent. These soils have a darker surface layer than is defined for the series, but this difference does not alter their use and behavior.

Jackson soils are similar to Downs soils and are commonly adjacent to Bertrand and Downs soils, which are on a slightly higher position in the landscape. Bertrand soils are well drained. Downs soils are silty throughout.

Typical pedon of Jackson silt loam, 0 to 2 percent slopes, approximately 940 feet south and 50 feet east of the northwest corner of sec. 7, T. 17 N., R. 1 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate fine granular structure; friable; many very fine and fine roots; neutral; abrupt smooth boundary.
B1—9 to 23 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; friable; common very fine and fine roots; few thin patchy clay films on faces of peds; neutral; clear wavy boundary.
B2t—23 to 41 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; strong fine subangular blocky structure; friable; common very fine and fine roots; few thin continuous and patchy clay films on faces of peds; medium acid; clear wavy boundary.
IIB3—41 to 44 inches; stratified brown (10YR 5/3) silt loam and yellowish brown (10YR 5/4) sandy loam; common fine faint brown (7.5YR 4/4) and common fine distinct grayish brown (10YR 5/2) mottles; weak moderate subangular blocky structure; very friable; medium acid; clear wavy boundary.
IIC—44 to 60 inches; brownish yellow (10YR 6/6) sand; single grain; loose; medium acid.

Solum thickness and depth to underlying sand range from 40 to 60 inches. Reaction ranges from neutral to strongly acid in the solum and is slightly acid or medium acid in the C horizon.

The A horizon has value of 3 or 4 and chroma of 2 or 3. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam. The IIC horizon has hue of 10YR or 7.5YR, value of 4 to 8, and chroma of 2 to 6. In some pedons, the C horizon has lamellae, or textural bands and contrasting colors, derived from the underlying parent material.

Kato Series

The Kato series consists of deep, poorly drained soils that are moderately permeable in the solum and rapidly permeable in the substratum. These soils are on valley bottoms and flood plains. They formed in silty deposits over sand. Slope ranges from 0 to 2 percent.

Kato soils are similar to Ettrick soils and are commonly adjacent to Boaz, Curran, Dells, Ettrick, and Palms soils on the landscape. Boaz and Curran soils are somewhat poorly drained and have more silt and less sand in the C horizon. Dells soils are somewhat poorly drained. Ettrick soils have more silt and less sand in the C horizon. Palms soils are organic soils underlain by loamy deposits.

Typical pedon of Kato silt loam, approximately 1,100 feet east and 1,380 feet south of the northwest corner of sec. 8, T. 17 N., R. 1 W.

A1—0 to 14 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine granular structure; friable; many very fine and medium roots; neutral; clear wavy boundary.
B21g—14 to 18 inches; grayish brown (2.5Y 5/2) silt loam; many medium prominent brown (7.5YR 4/4) mottles; moderate fine subangular blocky structure; friable; few very fine roots; medium acid; clear wavy boundary.
B22g—18 to 27 inches; gray (5Y 5/1) silt loam; few fine prominent strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; friable; medium acid; clear wavy boundary.
B23g—27 to 36 inches; olive gray (5Y 5/2) silt loam; common fine prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; slightly acid; abrupt smooth boundary.

IICg—36 to 60 inches; olive gray (5Y 5/2) sand; common medium prominent brownish yellow (10YR 6/8) mottles; single grain; loose; neutral.

Solum thickness and depth to underlying sand range from 20 to 40 inches. Reaction ranges from medium acid to mildly alkaline in the A horizon, from neutral to strongly acid in the B horizon, and from slightly acid to mildly alkaline in the IIC horizon.

The mollic epipedon ranges from 10 to 15 inches in thickness. The A1, or Ap, horizon has value of 2 or 3. The B2 horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam or silty clay loam. The B3 horizon, where present, has hue of 10YR or 5Y, value of 5 or 6, and chroma of 1 or 2. The IIC horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 8, and chroma of 1 to 3. It is sand or loamy sand.

Kickapoo Series

The Kickapoo series consists of deep, moderately well drained, moderately permeable soils on flood plains. These soils formed in loamy alluvium. Slope ranges from 0 to 3 percent.

Kickapoo soils are similar to Billett soils and are commonly adjacent to Ceresco, Coffeen, and Council soils on the landscape. Billett soils have an argillic horizon and are well drained and moderately well drained. Ceresco soils are somewhat poorly drained. Coffeen soils are somewhat poorly drained and have more silt and less sand throughout. Council soils are well drained and have an argillic horizon.

Typical pedon of Kickapoo fine sandy loam, 0 to 3 percent slopes, approximately 60 feet east and 120 feet south of the northwest corner of sec. 33, T. 15 N., R. 4 W.

A1—0 to 5 inches; very dark grayish brown (10YR 3/2) fine sandy loam, brown (10YR 5/3) dry; moderate fine granular structure; very friable; many fine and medium roots; mildly alkaline; abrupt smooth boundary.

C1—5 to 15 inches; dark brown (10YR 3/3) fine sandy loam with thin strata of yellowish brown (10YR 5/4) sand; moderate thick platy structure parting to weak fine subangular blocky; very friable; common fine roots; mildly alkaline; clear wavy boundary.

C2—15 to 26 inches; dark brown (10YR 3/3) loam with thin strata of yellowish brown (10YR 5/4) sand; few fine prominent red (2.5YR 4/6) mottles in lower part of horizon along root channels and in sand strata; moderate thick platy structure parting to weak fine subangular blocky; very friable; common fine roots; neutral; abrupt smooth boundary.

Ab—26 to 36 inches; black (10YR 2/1) fine sandy loam; weak medium subangular blocky structure; very friable; few fine roots; neutral; clear wavy boundary.

C3—36 to 60 inches; dark brown (10YR 4/3) fine sandy loam; few fine faint dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky structure; very friable; few fine and medium very dark grayish brown (10YR 3/2) organic stains on faces of peds and along old root channels; neutral.

Depth to the buried Ab horizon ranges from 20 to 40 inches. Reaction ranges from medium acid to mildly alkaline throughout this soil.

The A horizon has value of 3 or 4 and chroma of 1 to 3. The C horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 4. It is fine sandy loam or loam, but in some pedons, the lower part of the C horizon is sand or loamy sand.

La Farge Series

The La Farge series consists of moderately deep, well drained, moderately permeable soils on ridgetops and valley slopes. These soils formed in loess and partly in the underlying residuum of fine-grained glauconitic sandstone. Slope ranges from 4 to 20 percent.

La Farge soils are similar to Gale soils and are commonly adjacent to Council, Downs, Norden, and Urne soils on the landscape. Council soils are more than 60 inches deep over bedrock and have more sand and less silt throughout. Gale soils have less silt and clay in the lower part of the B horizon and in the C horizon. Downs soils are more than 60 inches deep over bedrock and are moderately well drained. Norden soils have more sand and less silt throughout the solum. Urne soils have more sand and less silt and clay and do not have an argillic horizon.

Typical pedon of La Farge silt loam, 12 to 20 percent slopes, eroded, approximately 1,300 feet south and 160 feet east of the northwest corner of sec. 32, T. 18 N., R. 4 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular and weak fine subangular blocky structure; friable; many fine roots; some particles of yellowish brown (10YR 5/4) subsoil material; neutral; abrupt smooth boundary.

B21t—8 to 13 inches; yellowish brown (10YR 5/4) silt loam; weak medium prismatic structure parting to moderate very fine and fine subangular blocky; firm; common very fine roots; common very fine pores; thin continuous brown (10YR 4/3) clay films on all faces of peds; a few light gray (10YR 7/2) uncoated silt grains on vertical faces of peds; a few black (N 2/0) iron and manganese segregations on faces of peds; a few very dark grayish brown (10YR 3/2) wormcasts; slightly acid; clear smooth boundary.

B22t—13 to 19 inches; yellowish brown (10YR 5/4) silt loam; weak medium prismatic structure parting to

moderate medium subangular blocky; firm; common very fine roots; few very fine and fine pores; thin continuous brown (10YR 4/3) clay films on most faces of peds; few light gray (10YR 7/2) uncoated silt grains and few black (N 2/0) iron and manganese segregations on vertical faces of peds; strongly acid; clear smooth boundary.

B23t—19 to 25 inches; yellowish brown (10YR 5/4) silt loam; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; firm; common very fine roots; thin discontinuous brown (10YR 4/3) clay films on faces of peds; common thin patchy black (N 2/0) iron and manganese segregations mainly on vertical faces of peds; strongly acid; clear smooth boundary.

IIB3t—25 to 31 inches; olive brown (2.5Y 4/4) fine sandy loam; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; few very fine roots; thin discontinuous brown (10YR 4/3) clay films on faces of peds and in pores; many black (5Y 2/2) specks throughout horizon; strongly acid; abrupt smooth boundary.

IICr1—31 to 40 inches; weakly consolidated banded olive yellow (2.5Y 6/6), black (5Y 2/2), and light olive brown (2.5Y 5/4) fine-grained sandstone that breaks to fine sandy loam; massive; friable but a few bands are firm; few very fine roots; olive yellow bands 1/16 to 1/8 inch thick are common throughout; few light olive brown bands 1/8 to 1/4 inch thick in the upper part; common black bands 1/4 to 3/8 inch thick in the upper part; abrupt wavy boundary.

IICr2—40 to 52 inches; weakly consolidated banded light yellowish brown (2.5Y 6/4), yellowish brown (10YR 5/8), and black (5Y 2/2) fine-grained sandstone that breaks to loamy fine sand; massive; friable; light yellowish brown bands are 1/4 to 3/8 inch thick, black bands are 1/8 to 1/4 inch thick and dominate the horizon; abrupt wavy boundary.

IICr3—52 to 60 inches; weakly consolidated banded yellowish brown (10YR 5/8) and light yellowish brown (2.5Y 6/4) fine-grained sandstone that breaks to fine sandy loam; massive; friable with some firm bands; black (5Y 2/2) specks are throughout horizon and give "pepper" effect.

Solum thickness and depth to sandstone bedrock range from 20 to 40 inches. Reaction ranges from neutral to very strongly acid in the solum.

The Ap, or A1, horizon has value of 2 to 4 and chroma of 1 to 3. The A2 horizon, where present, has value of 4 or 5 and chroma of 2 to 4. Some pedons have a B1 horizon. The B2t horizon has a value of 3 to 5 and chroma of 3 or 4. It is silt loam or silty clay loam.

The IIB3 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. It is sandy clay loam, loam, or fine sandy loam. The Cr horizon has hue of 10YR, 2.5Y, and 5Y, value of 4 to 7, and chroma of 3 to 8. It is weakly consolidated sandstone that can be dug with a spade, but digging becomes more difficult as depth increases.

Lows Series

The Lows series consists of deep, poorly drained soils that are moderately permeable in the solum and rapidly permeable in the substratum. These soils are on flood plains and low stream terraces. They formed in loamy alluvium underlain by sand. Slope ranges from 0 to 2 percent.

Lows soils are similar to Kato soils and are commonly adjacent to Hoopeston, Kato, Newson, and Shiffer soils on the landscape. Hoopeston soils are somewhat poorly drained and have less clay in the solum. Kato soils have more silt in the solum. Newson soils have more sand in the solum. Shiffer soils are somewhat poorly drained.

Typical pedon of Lows sandy loam, approximately 2,700 feet west and 900 feet south of the northeast corner of sec. 18, T. 18 N., R. 1 E.

A1—0 to 8 inches; very dark grayish brown (10YR 3/2) sandy loam, dark grayish brown (10YR 4/2) dry; few fine prominent dark yellowish brown (10YR 4/6) mottles; moderate medium granular structure; very friable; many very fine and fine roots; strongly acid; abrupt smooth boundary.

A2g—8 to 11 inches; grayish brown (2.5Y 5/2) sandy loam; many coarse prominent strong brown (7.5YR 5/8) mottles; weak thin platy structure; friable; common very fine roots; strongly acid; abrupt smooth boundary.

B1g—11 to 17 inches; light brownish gray (2.5Y 6/2) loam; many coarse prominent dark yellowish brown (10YR 4/6) mottles; weak medium subangular blocky structure; firm; few very fine roots; strongly acid; clear smooth boundary.

B2g—17 to 25 inches; light brownish gray (2.5Y 6/2) loam; common medium prominent yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; firm; few very fine roots; strongly acid; clear smooth boundary.

B3g—25 to 30 inches; light brownish gray (2.5Y 6/2) sandy loam; few medium prominent yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; few very fine roots; strongly acid; abrupt smooth boundary.

IIC—30 to 60 inches; grayish brown (2.5YR 5/2) sand; few medium prominent yellowish brown (10YR 5/6) mottles; single grain; loose; strongly acid.

Solum thickness ranges from 24 to 40 inches. Reaction ranges from slightly acid to strongly acid throughout the pedon.

The A1, or Ap, horizon has value of 2 or 3 and chroma of 1 or 2. The A2g horizon has hue of 2.5Y or 10YR, value of 5 to 7, and chroma of 1 or 2. The B1g horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is sandy loam or loam. The B2g horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. The B3g horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is loam, sandy loam, or loamy sand. The IIC horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 to 4. It is loamy sand or sand. In some pedons, thin layers of loam, sandy loam, or silt loam are in this horizon.

Loxley Series

The Loxley series consists of deep, very poorly drained, moderately rapidly permeable soils on lake basins and flood plains. These soils formed primarily in organic materials. Slope ranges from 0 to 2 percent.

Loxley soils are similar to Houghton soils and are commonly adjacent to Au Gres, Dawson, Meehan, and Newson soils on the landscape. Au Gres and Meehan soils are somewhat poorly drained and are sandy throughout. Dawson soils are organic soils underlain by sand. Houghton soils are organic soils that have a pH more than 5.0 (in water). Newson soils are poorly drained and are sandy throughout.

Typical pedon of Loxley mucky peat, approximately 2,240 feet east and 1,680 feet south of the northwest corner of sec. 3, T. 19 N., R. 1 E.

Oel—0 to 14 inches; dark reddish brown (5YR 2/2) broken face, dark reddish brown (5YR 2/2) rubbed hemic material; about 50 percent fiber, 20 percent rubbed; moderate thick platy structure; herbaceous fiber; extremely acid (pH 4.0, Truog method); clear smooth boundary.

Oal—14 to 27 inches; dark reddish brown (5YR 2/2) broken face, very dark brown (10YR 2/2) rubbed sapric material; about 20 percent fiber, 4 percent rubbed; moderate thick platy structure; herbaceous fiber; extremely acid (pH 4.0, Truog method); clear smooth boundary.

Oa2—27 to 60 inches; dark reddish brown (5YR 2/2) broken face, very dark brown (10YR 2/2) rubbed sapric material; about 60 percent fiber, 8 percent rubbed; massive; herbaceous fiber; extremely acid (pH 4.0, Truog method).

Thickness of the organic layers is more than 51 inches. Reaction is extremely acid or very strongly acid throughout the organic layers.

The surface tier is hemic or sapric material. The organic layers have hue of 5YR, 7.5YR, or 10YR, value of 2 to 4, and chroma of 2 to 4.

Meehan Series

The Meehan series consists of deep, somewhat poorly drained, rapidly permeable soils on stream terraces and lake basins. These soils formed in sandy deposits. Slope ranges from 0 to 3 percent. These soils have siliceous mineralogy rather than mixed mineralogy as defined for the series, but this difference does not alter their use and behavior.

Meehan soils are similar to Au Gres soils and are commonly adjacent to Au Gres, Newson, Tarr, Wautoma, and Wyeville soils on the landscape. Au Gres soils have a spodic horizon. Newson soils are poorly drained. Tarr soils are excessively drained and moderately well drained. Wautoma and Wyeville soils have a C horizon that is mostly clayey, and Wautoma soils are poorly drained.

Typical pedon of Meehan sand in an area of Meehan and Au Gres sands, 0 to 3 percent slopes, approximately 400 feet south and 1,800 feet east of the northwest corner of sec. 28, T. 19 N., R. 2 W.

A1—0 to 7 inches; very dark gray (10YR 3/1) sand, gray (10YR 5/1) dry; weak fine granular structure; very friable; many fine and very fine roots; medium acid; abrupt smooth boundary.

A2—7 to 9 inches; grayish brown (10YR 5/2) sand; few coarse prominent yellowish red (5YR 4/8) and few fine faint dark grayish brown (10YR 4/2) mottles; weak medium platy structure; very friable; few very fine roots; slightly acid; abrupt wavy boundary.

B2—9 to 27 inches; brown (10YR 5/3) sand; few fine faint light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; very friable; medium acid; clear smooth boundary.

C1—27 to 35 inches; pale brown (10YR 6/3) sand; many medium prominent strong brown (7.5YR 5/6) mottles; single grain; loose; medium acid; clear smooth boundary.

C2—35 to 60 inches; light gray (10YR 7/2) sand; few fine prominent strong brown (7.5YR 5/8) mottles; single grain; loose; medium acid.

Solum thickness ranges from 24 to 30 inches. Reaction ranges from strongly acid to neutral throughout the pedon.

The A1, or Ap, horizon has value of 2 or 3 and chroma of 1 or 2. The B2 horizon has value of 4 to 6 and chroma of 3 to 8. Some pedons have a B3 horizon. The C horizon has value of 4 to 7 and chroma of 2 to 4. It is medium or coarse sand.

Menasha Series

The Menasha series consists of deep, poorly drained, slowly permeable or very slowly permeable soils on lake basins. These soils formed in clayey lacustrine deposits

and a very thin silty mantle. Slope ranges from 0 to 2 percent.

Menasha soils are commonly adjacent to Wautoma and Wyeville soils on the landscape. Wautoma and Wyeville soils are sandy in the upper part, and Wyeville soils are somewhat poorly drained.

Typical pedon of Menasha silty clay loam, approximately 140 feet west and 1,200 feet north of the southeast corner of sec. 36, T. 18 N., R. 1 E.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.

B1g—8 to 13 inches; very dark gray (5Y 3/1) clay, gray (5Y 5/1) dry; few fine prominent yellowish brown (10YR 5/8) mottles; strong fine subangular blocky structure; firm; common very fine roots; neutral; abrupt wavy boundary.

B2g—13 to 23 inches; gray (5Y 5/1) clay; common fine prominent reddish brown (5YR 4/4) and strong brown (7.5YR 5/6) mottles; strong medium subangular blocky structure; firm; few very fine roots; mildly alkaline; clear wavy boundary.

B3—23 to 29 inches; reddish brown (5Y 4/4 and 5/3) clay; common medium prominent dark gray (5YR 4/1) and strong brown (7.5YR 5/8) mottles; moderate fine prismatic structure; very firm; common thin light gray (10YR 6/1) uncoated silt grains on vertical faces of peds; moderately alkaline; clear wavy boundary.

C—29 to 60 inches; laminated reddish brown (5YR 4/3) and reddish gray (5YR 5/2) clay; massive; very firm; some tendency to part along horizontal cleavage planes; violent effervescence; moderately alkaline.

Solum thickness ranges from 22 to 34 inches. Reaction ranges from slightly acid to moderately alkaline in the solum and is mildly alkaline or moderately alkaline in the C horizon.

The A horizon is neutral or has value of 2 or 3 and chroma of 1. The B1g horizon is neutral or has hue of 10YR, 2.5Y, or 5Y and value of 3 or 4. It is clay or silty clay, but subhorizons or silty clay loam are in some pedons. The B2g horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is clay, but subhorizons of silty clay are in some pedons. The C horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 2 to 4. It is clay or silty clay. Thin strata of silt or very fine sandy loam are in some pedons.

Meridian Series

The Meridian series consists of deep, well drained soils that are moderately permeable in the solum and rapidly permeable in the substratum. These soils are on stream terraces and valley slopes. They formed in loamy deposits overlying sandy deposits. Slope ranges from 0 to 6 percent.

Meridian soils are similar to Billett soils and are commonly adjacent to Billett, Dells, and Shiffer soils on the landscape. Billett soils have less silt and clay in the solum. Dells soils are somewhat poorly drained and have more silt and less sand in the solum. Shiffer soils are somewhat poorly drained.

Typical pedon of Meridian loam, 2 to 6 percent slopes, approximately 2,440 feet east and 820 feet north of the southwest corner of sec. 23, T. 19 N., R. 4 W.

Ap—0 to 7 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; friable; many very fine roots; neutral; abrupt smooth boundary.

B21t—7 to 13 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; many very fine roots; few coarse very dark brown (10YR 2/2) wormcasts; thin patchy dark yellowish brown (10YR 3/4) clay films on faces of peds; medium acid; clear smooth boundary.

B22t—13 to 22 inches; dark yellowish brown (10YR 4/6) loam; moderate medium subangular blocky structure; friable; many very fine roots; thin continuous dark yellowish brown (10YR 3/4) clay films on faces of peds; strongly acid; clear smooth boundary.

B3—22 to 26 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; very friable; strongly acid; abrupt smooth boundary.

IIC—26 to 60 inches; brownish yellow (10YR 6/6) sand; single grain; loose; strongly acid.

Solum thickness ranges from 20 to 40 inches. Reaction is slightly acid or neutral in the A horizon and ranges from slightly acid to strongly acid in the B horizon and C horizon.

The Ap, or A1, horizon has value and chroma of 2 or 3. Some pedons have an A2 horizon. The B2t horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. It is loam or sandy clay loam. The IIC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is loamy sand or sand. In some pedons, the sandy deposits have lamellae, or textural bands and contrasting colors, derived from the underlying parent material.

Newson Series

The Newson series consists of deep, poorly drained, rapidly permeable soils on stream terraces and lake basins. These soils formed in sandy deposits. Slope ranges from 0 to 2 percent. These soils have siliceous mineralogy rather than mixed mineralogy as defined for the series, but this difference does not alter their use and behavior.

Newson soils are similar to Wautoma soils and are commonly adjacent to Au Gres, Dawson, Meehan, and Wautoma soils on the landscape. Au Gres soils are somewhat poorly drained and have a spodic horizon. Dawson soils are very poorly drained organic soils. Meehan soils are somewhat poorly drained. Wautoma soils have a C horizon that is mostly clayey.

Typical pedon of Newson loamy sand, approximately 2,600 feet west and 100 feet south of the northeast corner of sec. 29, T. 19 N., R. 1 E.

O2—2 inches to 0; black (10YR 2/1) muck, moderate medium subangular blocky structure; very friable; few fine and very fine roots; very strongly acid; abrupt smooth boundary.

A1—0 to 6 inches; black (10YR 2/1) loamy sand, very dark gray (10YR 3/1) dry; weak medium and fine subangular blocky structure; very friable; many very fine roots; light gray (10YR 7/1) sand in few pockets and along faces of peds; very strongly acid; clear wavy boundary.

B2g—6 to 16 inches; dark gray (10YR 4/1) loamy sand; few fine and medium prominent dark yellowish brown (10YR 4/6) mottles; weak medium and fine subangular blocky structure; very friable; very strongly acid; clear wavy boundary.

B3—16 to 25 inches; grayish brown (10YR 5/2) loamy sand; few medium prominent brownish yellow (10YR 6/8) mottles; weak medium and fine subangular blocky structure; very friable; very strongly acid; clear wavy boundary.

C—25 to 60 inches; very pale brown (10YR 8/4) sand; common medium prominent brownish yellow (10YR 8/4) mottles; single grain; loose; slightly acid.

Solum thickness ranges from 20 to 40 inches. Reaction ranges from medium acid to extremely acid throughout the solum and from very strongly acid to slightly acid in the C horizon.

Some pedons do not have an O2 horizon. The A horizon has hue of 10YR, 2.5Y, or 5Y, value of 2 or 3, and chroma of 1 or 2. The B2g horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 7, and chroma of 1 or 2. It is loamy sand or sand. The C horizon has hue of 10YR or 2.5Y, value of 3 to 8, and chroma of 1 to 6.

Norden Series

The Norden series consists of moderately deep, well drained, moderately permeable soils on ridgetops and valley slopes. These soils formed in a thin loess mantle and in loamy residuum of fine-grained glauconitic sandstone. Slope ranges from 4 to 45 percent.

Norden soils are similar to La Farge soils and are commonly adjacent to Council, Downs, La Farge, and Urne soils on the landscape. Council soils are more than 60 inches deep over bedrock. Downs soils are more than 60 inches deep over bedrock and are moderately well drained. They have more silt and less sand throughout. La Farge soils have more silt and less sand in the solum. Urne soils are somewhat excessively drained and have less silt and clay in the solum.

Typical pedon of Norden loam, in an area of Norden, Urne, and Dorerton soils, 20 to 45 percent slopes, approximately 1,000 feet west and 750 feet south of the northeast corner of sec. 10, T. 15 N., R. 4 W.

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) loam, dark gray (10YR 5/2) dry; moderate fine granular structure; very friable; many very fine roots; neutral; abrupt wavy boundary.

A2—3 to 10 inches; brown (10YR 4/3) loam; weak medium platy structure; very friable; many fine roots; neutral; clear smooth boundary.

B21t—10 to 16 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable; many very fine roots; thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B22t—16 to 23 inches; yellowish brown (10YR 5/4) sandy clay loam; weak medium subangular blocky structure; friable; few fine and very fine roots; about 5 percent sandstone pebbles; thin patchy clay films on faces of peds; strongly acid; clear wavy boundary.

B3t—23 to 29 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable; few very fine roots; about 10 percent sandstone pebbles; thick patchy clay films on faces of peds; strongly acid; abrupt smooth boundary.

Cr1—29 to 40 inches; olive (5Y 4/4) weakly consolidated fine-grained sandstone breaking to fine sandy loam when dug with spade; about 20 percent strongly consolidated sandstone pebbles; abrupt smooth boundary.

Cr2—40 to 60 inches; olive brown (2.5Y 4/4) weakly consolidated fine-grained sandstone breaking to loamy fine sand when dug with spade; digging with spade becomes more difficult as depth increases; about 40 percent strongly consolidated sandstone pebbles and flagstones.

Solum thickness and depth to sandstone bedrock range from 20 to 40 inches. Reaction ranges from strongly acid to neutral in the A horizon and B horizon.

The A1, or Ap, horizon has value of 2 to 4 and chroma of 2 or 3. The A2 horizon has value of 3 to 5 and chroma of 2 or 3. Texture of the A horizons is loam or silt loam. Some pedons do not have an A2 horizon and some pedons have a B1 horizon. The B2t horizon has value of 4 or 5 and chroma of 3 to 5. It is loam or sandy clay loam. Some pedons have a B3 horizon. The Cr horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 4 to 6. It is weakly consolidated sandstone that can be dug with a spade, but digging becomes more difficult as depth increases.

Palms Series

The Palms series consists of deep, very poorly drained soils that are moderately rapidly permeable in the upper part of the profile and moderately slowly permeable in the lower part. These soils are on lake basins and flood plains. They formed in organic materials underlain by loamy deposits. Slope ranges from 0 to 2 percent.

Palms soils are similar to Houghton soils and are commonly adjacent to Ceresco, Coffeen, Ettrick, and Houghton soils on the landscape. Ceresco and Coffeen soils are somewhat poorly drained mineral soils. Ettrick soils are poorly drained mineral soils. Houghton soils have organic materials to a depth of 51 inches or more.

Typical pedon of Palms muck, approximately 2,100 feet west and 1,300 feet south of the northeast corner of sec. 21, T. 16 N., R. 2 W.

Oa1—0 to 16 inches; black (10YR 2/1) broken face and rubbed sapric material; about 20 percent fiber, 2 percent rubbed; weak fine granular structure; very friable; herbaceous fiber; neutral (pH 7.3, Truog method); clear wavy boundary.

Oa2—16 to 30 inches; black (10YR 2/1) broken face and rubbed sapric material; about 20 percent fiber, 2 percent rubbed; moderate coarse prismatic structure parting to moderate coarse subangular blocky; friable; herbaceous fiber; neutral (pH 7.3, Truog method); clear smooth boundary.

Oa3—30 to 34 inches; black (10YR 2/1) broken face and rubbed sapric material; about 10 percent fiber, 2 percent rubbed; massive; friable; herbaceous fiber with some silt loam strata; neutral (pH 7.3, Truog method); clear wavy boundary.

IICg—34 to 60 inches; dark gray (10YR 4/1) silty clay loam; massive; friable; moderately alkaline.

Thickness of the organic layers ranges from 16 to 51 inches. Reaction in the organic layers and IIC horizon ranges from medium acid to neutral.

The organic layers are neutral or have hue of 10YR. They are dominantly sapric material, but some pedons contain layers of hemic material as thick as 6 inches. The IICg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2. It is silty clay loam, silt loam, or fine sandy loam.

Reedsburg Series

The Reedsburg series consists of deep, somewhat poorly drained soils that are moderately permeable in the upper part of the profile and slowly permeable in the lower part. These soils are on ridgetops. They formed in loess and in the underlying cherty clay or clay residuum of limestone. Slope ranges from 0 to 6 percent.

Reedsburg soils are similar to Atterberry soils and are commonly adjacent to Atterberry, Valton, and Wildale soils on the landscape. Atterberry soils have more silt and less clay in the lower part of the B horizon and in the C horizon. Valton soils are well drained. Wildale soils are well drained and mostly clayey throughout.

Typical pedon of Reedsburg silt loam, 2 to 6 percent slopes, approximately 2,020 feet west and 600 feet south of the northeast corner of sec. 24, T. 16 N., R. 3 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; moderate fine subangular blocky structure; very friable; many very fine roots; neutral; abrupt smooth boundary.

B1—8 to 16 inches; yellowish brown (10YR 5/4) silt loam; moderate fine subangular blocky structure; friable; common very fine roots; strongly acid; clear smooth boundary.

B21t—16 to 21 inches; brown (10YR 5/3) silty clay loam; few fine prominent strong brown (7.5YR 5/6) and few fine faint light brownish gray (10YR 6/2) mottles; moderate fine subangular blocky structure; friable; thin patchy clay films on faces of peds; common very fine roots; strongly acid; clear wavy boundary.

B22t—21 to 27 inches; pale brown (10YR 6/3) silty clay loam; many coarse prominent strong brown (7.5YR 5/6) and few fine faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; common very fine roots; strongly acid; clear wavy boundary.

IIB23t—27 to 39 inches; variegated strong brown (7.5YR 5/6) and dark red (2.5YR 3/6) cherty clay; common medium distinct grayish brown (10YR 5/2) mottles; strong very fine angular blocky structure; very firm; medium patchy clay films on faces of peds; about 25 percent chert fragments; very strongly acid; gradual wavy boundary.

IIB24t—39 to 60 inches; variegated yellowish dark red (5YR 5/6) and strong brown (7.5YR 5/6) cherty clay; common fine prominent gray (10YR 5/1) mottles; strong very fine angular blocky structure; very firm; patchy clay films on faces of peds; about 25 percent chert fragments; very strongly acid.

Solum thickness is greater than 60 inches. Thickness of the loess mantle ranges from 15 to 36 inches. Reaction ranges from neutral to slightly acid in the A horizon and from slightly acid to very strongly acid in the B horizon. Chert fragments make up 0 to 15 percent of the loess horizons and from 5 to 35 percent of the IIB horizons.

The A horizon has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon. The B2t horizon has value of 4 to 6 and chroma of 2 to 4. It is silt loam or silty clay loam. The IIBt horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 to 5, and chroma of 2 to 6. It is clay or cherty clay. In some pedons, pockets or

discontinuous lenses that contain from 45 to 65 percent sand are in the IIB horizon.

Shiffer Series

The Shiffer series consists of deep, somewhat poorly drained soils that are moderately permeable in the solum and rapidly permeable in the substratum. These soils are on stream terraces and valley slopes. They formed in loamy deposits and in the underlying sandy deposits. Slope ranges from 0 to 3 percent.

Shiffer soils are similar to Dells soils and are commonly adjacent to Billett, Boaz, Dells, and Meridian soils on the landscape. Billett soils are well drained and moderately well drained and have less silt and clay in the solum. Boaz soils have more silt and less sand in the solum and the C horizon. Dell soils have more silt and less sand in the solum. Meridian soils are well drained.

Typical pedon of Shiffer loam, 0 to 3 percent slopes, approximately 2,250 feet west and 150 feet north of the southeast corner of sec. 7, T. 17 N., R. 4 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) loam, grayish brown (10YR 5/2) dry; weak moderate subangular blocky structure; friable; many fine and medium roots; slightly acid; abrupt smooth boundary.

B1t—9 to 14 inches; dark brown (10YR 4/3) loam; few fine prominent brownish yellow (10YR 6/8) mottles; weak moderate subangular blocky structure; friable; few thin clay films on faces of peds; common fine and medium roots; slightly acid; clear wavy boundary.

B2t—14 to 21 inches; brown (10YR 5/3) loam; common medium prominent strong brown (7.5YR 5/8) and few fine faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; many moderately thick clay films on faces of peds and in pores; few medium roots; slightly acid; clear wavy boundary.

IIB3t—21 to 29 inches; pale brown (10YR 6/3) sandy loam; few fine prominent yellowish brown (10YR 5/8) and common medium faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; many moderately thick clay films on faces of peds and some clay bridging between sand grains; slightly acid; abrupt smooth boundary.

IIC—29 to 60 inches; very pale brown (10YR 7/3) loamy sand; common medium prominent yellowish brown (10YR 5/8) mottles; single grain; loose; slightly acid.

Solum thickness ranges from 20 to 40 inches. Reaction ranges from slightly acid to strongly acid in the solum and C horizon.

The Ap, or A1, horizon has value of 2 or 3 and chroma of 1 or 2. The B2t horizon has value of 4 to 6 and chroma of 3 or 4. It is loam or sandy clay loam. The IIB3 horizon has value of 5 or 6 and chroma of 2 to 4. The IIC horizon has value of 6 or 7 and chroma of 2 to 4. It is loamy sand or sand.

Tarr Series

The Tarr series consists of deep, excessively drained and moderately well drained, rapidly permeable soils on stream terraces and valley slopes. These soils formed in sand deposits weathered from sandstone. Slope ranges from 0 to 45 percent.

Tarr soils are similar to Impact soils and are commonly adjacent to Billett, Boone, Impact, Meehan, and Wyeville soils on the landscape. Billett soils are well drained and moderately well drained and have more silt and clay in the solum. Boone soils are excessively drained and are moderately deep over sandstone bedrock. Impact soils have an umbric epipedon. Meehan soils are somewhat poorly drained. Wyeville soils are somewhat poorly drained and have a clayey C horizon.

Typical pedon of Tarr sand, 0 to 6 percent slopes, approximately 100 feet north and 2,000 feet east of the southwest corner of sec. 32, T. 19 N., R. 4 W.

O1—2 inches to 0; organic layer that consists of decomposing roots, leaves, and twigs.

A1—0 to 4 inches; very dark brown (10YR 2/2) sand, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

B2—4 to 11 inches; dark yellowish brown (10YR 3/4) sand; weak fine subangular blocky structure; friable; common fine and medium roots; strongly acid; clear smooth boundary.

B3—11 to 32 inches; dark yellowish brown (10YR 4/6) sand; weak fine subangular blocky structure; friable; medium acid; clear smooth boundary.

C—32 to 60 inches; yellowish brown (10YR 5/8) sand; single grain; loose; medium acid.

Solum thickness ranges from 15 to 40 inches. Reaction ranges from very strongly acid to slightly acid in the solum and C horizon. Pebbles make up 0 to 5 percent of the pedon.

The A horizon has value of 2 to 5 and chroma of 1 to 4. Some pedons have an A2 horizon. The B horizon has hue of 10YR or 7.5YR, value of 3 to 6, and chroma of 3 to 8. It is fine sand or medium sand. The C horizon has hue of 10YR or 7.5YR and value and chroma of 3 to 8. Some pedons have lamellae, less than 3 inches thick, of loamy sand or sandy loam. Other pedons have contrasting color bands that are derived from the underlying sandstone.

Urne Series

The Urne series consists of moderately deep, somewhat excessively drained, moderately rapidly

permeable soils on ridgetops and valley slopes. These soils formed in loamy residuum of fine-grained glauconitic sandstone. Slope ranges from 4 to 45 percent.

Urne soils are similar to Eleva soils and are commonly adjacent to Boone, Council, Eleva, Downs, La Farge, and Norden soils on the landscape. Boone soils are sandy. Council soils are more than 60 inches deep over bedrock. Eleva soils have an argillic horizon and generally are underlain by medium-grained sandstone. Downs soils are more than 60 inches deep over bedrock and have more silt and clay throughout. La Farge and Norden soils have more silt and clay in the solum.

Typical pedon of Urne fine sandy loam in an area of Norden, Urne, and Dorerton soils, 20 to 45 percent slopes, approximately 1,200 feet east and 2,400 feet north of the southwest corner of sec. 35, T. 19 N., R. 2 W.

A1—0 to 2 inches; very dark brown (10YR 2/2) fine sandy loam; moderate fine granular structure; very friable; many fine roots; slightly acid; clear wavy boundary.

B1—2 to 20 inches; light olive brown (2.5Y 5/4) fine sandy loam; weak fine subangular blocky structure; very friable; few small fragments of sandstone; common fine roots; slightly acid; clear wavy boundary.

B2—20 to 32 inches; olive brown (2.5Y 4/4) fine sandy loam; weak fine subangular blocky structure; friable; few small fragments of sandstone; common fine roots; strongly acid; gradual wavy boundary.

C1—32 to 38 inches; grayish green (5G 4/2) fine sandy loam; massive; firm; few small fragments of sandstone; slightly acid; abrupt smooth boundary.

Cr—38 to 60 inches; light olive brown (2.5Y 5/6) weakly consolidated fine-grained glauconitic sandstone.

Solum thickness and depth to sandstone bedrock range from 20 to 40 inches. Reaction ranges from strongly acid to neutral throughout the pedon.

The A horizon has value of 2 or 3 and chroma of 1 to 3. The B2 horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is fine sandy loam or very fine sandy loam. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 7, and chroma of 2 to 6. It is loamy sand, loamy fine sand, or very fine sandy loam. Some pedons do not have a C horizon. The Cr horizon is weakly consolidated, fine-grained glauconitic sandstone that is interbedded with siltstone in some pedons. In most pedons, the sandstone is soft enough to be dug with a spade, but in some pedons, the sandstone becomes more strongly consolidated as depth increases.

Valton Series

The Valton series consists of deep, well drained soils that are moderately permeable in the upper part of the profile and slowly permeable in the lower part. These soils are on ridgetops and valley slopes. They formed in loess and in the underlying clayey residuum of limestone. Slope ranges from 2 to 45 percent.

Valton soils are similar to Downs soils and are commonly adjacent to Dorerton, Downs, Reedsburg, and Wildale soils on the landscape. Dorerton soils have more sand and less clay throughout and have many limestone or sandstone fragments in the lower part of the B horizon and in the C horizon. They are excessively drained. Downs soils are moderately well drained and have more silt and less clay in the lower part of the B horizon and in the C horizon. Reedsburg soils are somewhat poorly drained. Wildale soils are mostly clayey throughout.

Typical pedon of Valton silt loam, 6 to 12 percent slopes, eroded, approximately 540 feet south and 150 feet east of the northwest corner of sec. 15, T. 16 N., R. 2 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular and moderate very fine and fine subangular blocky structure; friable; some particles of dark yellowish brown (10YR 4/4) subsoil material; many fine and very fine roots; about 2 percent chert fragments; slightly acid; abrupt smooth boundary.

B21t—9 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine and medium subangular blocky structure with some moderate fine angular blocky and moderate thick platy; friable; about 2 percent chert fragments; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; common very fine roots; few thin light gray (10YR 7/2) uncoated silt grains on vertical faces of peds; common very fine and few fine pores; few wormcasts and channels; medium acid; gradual smooth boundary.

B22t—14 to 22 inches; brown (7.5YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure with some angular blocky; firm; about 2 percent chert fragments; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; common very fine roots; thin light gray (10YR 7/2) uncoated silt grains on vertical faces of peds; common very fine root pores; strongly acid; clear wavy boundary.

IIB23t—22 to 32 inches; yellowish red (5YR 4/6) silty clay; moderate medium and coarse prismatic structure parting to strong medium and coarse angular blocky; extremely firm; about 5 percent chert fragments with slight evidence of stone line; thin continuous yellowish red (5YR 4/6) clay films and thin patchy black (N 2/0) iron and manganese segregations on top, bottom, and vertical faces of peds; common very fine roots mainly on surface of peds; few light gray (10YR 7/2) uncoated silt grains

on vertical faces of peds; common very fine and few fine pores; very strongly acid; gradual wavy boundary.

IIB24t—32 to 44 inches; strong brown (7.5YR 5/6) silty clay; moderate coarse prismatic structure parting to strong medium and coarse angular blocky; extremely firm; about 6 percent chert fragments; thin continuous yellowish red (5YR 4/6) clay films and common thin patchy black (N 2/0) iron and manganese segregations on top, vertical, and bottom faces of peds; a few peds have interior color of yellowish red (5YR 5/6); few very fine roots mainly between faces of peds; few very fine pores; a few peds with light gray (10YR 7/2) uncoated silt grains mainly on vertical faces of peds, but some on tops of peds; slickensides are common between the larger peds; strongly acid; gradual wavy boundary.

IIB31t—44 to 55 inches; strong brown (7.5YR 5/6) silty clay; moderate coarse prismatic structure parting to strong coarse angular blocky; extremely firm; about 6 percent chert fragments; thin continuous yellowish red (5YR 4/6) clay films and common thin patchy black (N 2/0) iron and manganese segregations on top, vertical, and bottom faces of peds; few very fine roots mainly between faces of peds; some light gray (10YR 7/2) uncoated silt grains mainly on vertical faces of peds; few very fine pores; slickensides are common between the large peds; strongly acid; gradual wavy boundary.

IIB32t—55 to 60 inches; yellowish red (5YR 4/6) clay; moderate coarse prismatic structure parting to moderate coarse angular blocky; extremely firm; about 5 percent chert fragments; thin continuous yellowish red (5YR 4/6) clay films and thin patchy black (N 2/0) iron and manganese segregations mainly on vertical faces of peds, but a few on top faces; one pocket of light gray (10YR 7/2) uncoated silt grains; few very fine roots mainly between faces of peds; few very fine pores; very strongly acid.

Solum thickness is greater than 60 inches. Thickness of the loess mantle ranges from 20 to 30 inches. Reaction ranges from strongly acid to neutral in the A horizon, from strongly acid to slightly acid in the B horizon, and from extremely acid to medium acid in the IIB horizon. Chert fragments make up 2 to 15 percent of the loess horizons and 5 to 35 percent of the IIB horizon.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam. The IIB horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 to 5, and chroma of 4 to 8. It is silty clay, clay, cherty silty clay, or cherty clay.

In some pedons, individual subhorizons in the IIB horizon have variegated colors that have chroma of 2, reflecting the color of the parent material. Some pedons have mottles of high chroma in the subsoil, and some pedons have mottles of low chroma below a depth of 36 inches because of wetness. In some pedons, pockets or discontinuous lenses that contain 45 to 65 percent sand by volume are in the IIB horizon.

Wautoma Series

The Wautoma series consists of deep, poorly drained soils that are moderately rapidly permeable in the upper part of the profile and slowly or very slowly permeable in the lower part. These soils are on lake basins. They formed in sandy deposits and the underlying clayey lacustrine deposits. Slope ranges from 0 to 2 percent.

Wautoma soils are similar to Newson soils and are commonly adjacent to Dawson, Menasha, Newson, and Wyeville soils on the landscape. Dawson soils are very poorly drained organic soils underlain by sand. Menasha soils are clayey below the surface layer. Newson soils are sandy throughout. Wyeville soils are somewhat poorly drained.

Typical pedon of Wautoma sand, approximately 250 feet south and 400 feet east of the center of sec. 15, T. 18 N., R. 1 E.

A1—0 to 7 inches; very dark gray (10YR 3/1) sand, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; very friable; many very fine and fine roots; strongly acid; clear wavy boundary.

C1g—7 to 14 inches; gray (10YR 5/1) sand; few fine prominent strong brown (7.5YR 5/6) mottles; single grain; very friable; many very fine roots; strongly acid; clear wavy boundary.

C2g—14 to 22 inches; gray (10YR 5/1) loamy sand; common fine prominent yellowish red (5YR 5/8) mottles; massive; very friable; some tendency to part along horizontal cleavage planes; common very fine and fine roots; strongly acid; clear smooth boundary.

IIC3—22 to 30 inches; yellowish red (5YR 4/6) clay; many fine prominent gray (10YR 6/1), common fine faint red (2.5YR 4/6) and reddish brown (5YR 5/4) mottles; massive; firm; some tendency to part along horizontal cleavage planes; strongly acid; gradual wavy boundary.

IIC4—30 to 45 inches; reddish brown (5YR 5/4) silty clay loam; many medium prominent gray (5Y 6/1) and few fine prominent yellowish brown (10YR 5/8) mottles; massive; firm; some tendency to part along horizontal cleavage planes; strongly acid; gradual wavy boundary.

IIC5—45 to 60 inches; reddish brown (5YR 5/4) silty clay; common fine prominent gray (5Y 6/1) mottles; massive; firm; strongly acid.

Solum thickness ranges from 20 to 36 inches. Reaction is strongly acid or medium acid in the A horizon

and C horizon and ranges from strongly acid to neutral in the IIC horizon.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. The IIC horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 2 to 6. It is silty clay loam, silty clay, or clay. Thin strata of very fine sand, silt loam, or silt are in some pedons.

Wildale Series

The Wildale series consists of deep, well drained soils that are moderately permeable in the upper part of the profile and slowly permeable in the lower part. These soils are on ridgetops and valley slopes. They formed in a thin loess mantle and in the underlying clayey residuum of limestone. Slope ranges from 2 to 45 percent.

Wildale soils are similar to Valton soils and are commonly adjacent to Brodale, Dorerton, Reedsburg, and Valton soils on the landscape. Brodale soils have less clay throughout and are underlain by sandstone bedrock at a depth of 40 to 60 inches. Dorerton soils have less clay throughout and have many limestone or sandstone fragments in the lower part of the B horizon and in the C horizon. They are excessively drained. Reedsburg soils are somewhat poorly drained and have more silt and less clay in the upper part of the B horizon. Valton soils have more silt and less clay in the upper part of the B horizon.

Typical pedon of Wildale silt loam, 2 to 6 percent slopes, approximately 620 feet east and 570 feet south of the northwest corner of sec. 15, T. 16 N., R. 2 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular and weak fine subangular blocky structure; friable; about 3 percent chert fragments; few dark yellowish brown (10YR 4/4) wormcasts and particles of subsoil material; common very fine roots; many very fine pores; neutral; abrupt smooth boundary.

B1t—9 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular and angular blocky structure and weak thin and medium platy structure; firm; thin brown (7.5YR 4/4) clay films on faces of peds and in root pores and channels; scattered light gray (10YR 7/2) uncoated silt grains on faces of some peds; about 10 percent chert fragments; common very fine roots; common very fine pores; medium acid; clear wavy boundary.

IIB21t—15 to 21 inches; yellowish red (5YR 4/6) clay; moderate medium prismatic structure parting to strong fine and medium angular blocky; extremely firm; thin continuous yellowish red (5YR 5/6) clay films on faces of peds; light gray (10YR 7/2) uncoated silt grains on vertical faces of peds mainly in the upper 3 inches of the horizon; common very fine roots; few very fine pores; very strongly acid; gradual wavy boundary.

IIB22t—21 to 30 inches; yellowish red (5YR 4/6) clay; moderate medium prismatic structure parting to strong medium and coarse angular blocky; extremely firm; thin continuous yellowish red (5YR 4/6) clay films on faces of peds; common very fine roots mainly between faces of peds; few very fine pores and root channels; very strongly acid; gradual wavy boundary.

IIB23t—30 to 41 inches; yellowish red (5YR 4/6) clay; moderate medium and coarse prismatic structure parting to strong medium and coarse angular blocky; extremely firm; thin continuous yellowish red (5YR 4/6) clay films; few very fine roots mainly between faces of peds; about 7 percent chert fragments; very strongly acid; gradual wavy boundary.

IIB24t—41 to 52 inches; yellowish red (5YR 4/6) clay; moderate coarse prismatic structure parting to strong medium and coarse angular blocky; extremely firm; thin continuous yellowish red (5YR 4/6) clay films on faces of peds; few very fine roots mainly between faces of peds; about 7 percent chert fragments; very strongly acid; gradual wavy boundary.

IIB31t—52 to 60 inches; yellowish red (5YR 4/6) clay; moderate coarse prismatic structure parting to moderate coarse angular blocky; very firm; thin continuous yellowish red (5YR 4/6) clay films; a few black (N 2/0) soft iron and manganese concretions; few very fine roots between faces of peds; few very fine pores; about 7 percent chert fragments; very strongly acid.

Solum thickness is greater than 60 inches. The silty mantle ranges from 5 to 15 inches in thickness. Reaction ranges from neutral to medium acid in the A horizon and from medium acid to extremely acid in the B and IIB horizons. Chert fragments make up 0 to 25 percent of the loess horizons and 5 to 35 percent of the IIB horizon.

The A horizon has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon. The B1t horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. It is silt loam, silty clay loam, or the cherty analogue of these textures. Some pedons have a B1 horizon, rather than a B1t horizon, or have neither.

The IIB2t horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 to 6, and chroma of 4 to 8. Some pedons have variegated color or layers that have hue of 10YR. The IIB2t horizon is typically silty clay, clay, or the cherty analogues of these textures, but some pedons have subhorizons of sandy clay, silty clay loam, or clay loam.

Wyeville Series

The Wyeville series consists of deep, somewhat poorly drained soils that are moderately rapidly permeable in the upper part of the profile and slowly or very slowly permeable in the lower part. These soils are on lake basins. They formed in sandy deposits and in the underlying clayey lacustrine deposits. Slope ranges from 0 to 3 percent.

Wyeville soils are similar to Wautoma soils and are commonly adjacent to Au Gres, Hoopeston, Meehan, Newson, Tarr, and Wautoma soils on the landscape. Au Gres and Meehan soils are sandy throughout. Hoopeston soils have more silt and clay in the upper part of the B horizon and more sand and less silt and clay in the C horizon. Newson soils are poorly drained and are sandy throughout. Tarr soils are excessively drained and moderately well drained and are sandy throughout. Wautoma soils are poorly drained.

Typical pedon of Wyeville loamy sand, 0 to 3 percent slopes, approximately 340 feet west and 20 feet north of the southeast corner of sec. 36, T. 19 N., R. 1 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy sand, grayish brown (10YR 5/2) dry; weak fine granular structure; many fine roots; medium acid; abrupt smooth boundary.

A21—9 to 13 inches; dark brown (7.5YR 4/4) sand; weak thin platy structure; very friable; common fine roots; medium acid; clear wavy boundary.

A22—13 to 27 inches; dark brown (7.5YR 4/4) sand; common medium faint brown (10YR 5/3) and few fine distinct red (2.5YR 4/6) mottles; weak medium subangular blocky structure; very friable; few fine roots; medium acid; clear wavy boundary.

IIB2t—27 to 46 inches; reddish brown (5YR 4/4) silty clay; many fine distinct grayish brown (10YR 5/2) and common fine prominent yellowish red (5YR 5/8) mottles; moderate fine subangular blocky structure; firm; thin continuous clay films on faces of peds and in pores; slightly acid; gradual wavy boundary.

IIC—46 to 60 inches; reddish brown (5YR 4/4) silty clay; many fine distinct grayish brown (10YR 5/2), common fine distinct light reddish brown (5YR 6/4), and few fine distinct yellowish red (5YR 5/6) mottles; massive; firm; slightly acid.

Solum thickness ranges from 24 to 50 inches. Reaction ranges from strongly acid to neutral throughout the pedon.

The Ap horizon has value of 2 to 4 and chroma of 1 to 3. The A1 horizon has value of 2 or 3 and chroma of 1 or 2. The A2 horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is sand or loamy sand. The IIC horizon has hue of 5YR or 7.5YR and value and chroma of 4 to 6. It is silty clay or clay. In some pedons, thin strata of very fine sand, silt loam, or silt are in the IIC horizon.

Formation of the Soils

This section describes the geology and underlying material in Monroe County. It also describes the factors of soil formation as they relate to the soils in the county and explains the processes of soil formation, or horizon differentiation.

Geology

Robert N. Cheetham, Jr., geologist, Soil Conservation Service, helped prepare this section.

Seven well defined bedrock or geologic formations outcrop in Monroe County. The youngest, the Windrow Formation of Cretaceous age, has only a few exposures in the county. Outcrops are patchy and no more than 20 feet thick. Thought to be an ancient high level terrace sand and gravel deposit, the Windrow Formation outcrops as a ferruginous sandstone or pebble conglomerate. Pebbles are mostly well polished rounded quartz or subangular chert.

A profound unconformity exists between the Windrow Formation and the Paleozoic rocks. The youngest Paleozoic rocks are sandstones of the Ordovician St. Peter Formation. The St. Peter Formation ranges from 0 to 70 feet thick. Its lithology varies from a fine- to medium-grained quartz sand. The quartz grains are typically frosted or rounded. The St. Peter Formation has a valley phase of shales and clay. Much of the sandstone has been removed by subaerial erosion, and isolated remnants are more common in the southern part of the county. Certain irregular areas of sandstone may represent a filling of pre-St. Peter Formation sinkholes or valleys. The St. Peter Formation was deposited on a limestone terrain which had a relief of several hundred feet and a somewhat developed karst topography.

The Oneota Formation caps the highest ridges, which are in the southwestern and south-central parts of the county. This formation is dominantly a cherty, calcitic dolomitic limestone with some sandstone near the base. The formation ranges from 120 to 170 feet thick.

The Upper Cambrian formations are dominantly sandstones but contain some carbonates and shales. The youngest Cambrian formation is the Jordan, which is mostly a quartz sandstone with shale partings. The Jordan becomes dolomitic near contact with the overlying Oneota Formation. It is as much as 70 feet thick. Below the Jordan is the St. Lawrence Formation, sometimes called "quarry rock," as it was used locally as a building stone. The rock varies from calcareous yellow sandstone to shale or siltstone. The base is marked by a dolomitic sandstone and conglomerate. The formation, depending on lithology, may form a topographic bench or a slope. The St. Lawrence Formation ranges from 120 to 170 feet in thickness. Below the St. Lawrence is the Franconia Formation, recently renamed the Lone Rock. Predominantly a quartz sandstone, it may be heavily charged with glauconite, and interbedded with conglomerates, micaceous shales, and silty sandstones. The Lone Rock Formation ranges from 120 to 170 feet thick. The Jordan, St. Lawrence, and Lone Rock formations underlie the valley slopes and narrow ridgetops adjacent to and north and east of the Oneota Formation and the ridgetops and upper side slopes in the remainder of the county.

The Wonewoc Formation, formerly called the Dresbach, underlies the lower valley slopes and narrow ridges, in the northern one-third and along the southeastern boundary of the county. This formation is a quartz sandstone that has coarse sand as the major component.

The Paleozoic rocks have a low dip to the southwest, at about 15 feet per mile. According to Twenhofel and Thwaites, the strata form "a series of slight monoclines, separated by broader areas of nearly flat-lying rocks," and these are "slight folds parallel to the dip" (*7*). There may be minor faulting not observed during the general county reconnaissance and some steeper dips associated with Oneota bioherms or reefs.

The northeastern and east-central parts of the county are covered with sandy and clayey deposits of Glacial Lake Wisconsin.

Factors of Soil Formation

The factors that determine the kind of soil that forms at any given point are composition of the parent material; the climate under which the soil material has accumulated and weathered; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time the forces of soil formation have acted on the soil material (*3*).

Climate and plant and animal life are active factors of soil formation. They alter the accumulated material and bring about the development of genetically related horizons. The effects of climate and plant and animal life

are conditioned by relief. The parent material also affects the kind of soil that can be formed and, in extreme cases, determines it almost entirely. Finally, time is needed to change the parent material into a soil. A long time is generally required for the development of distinct horizons.

The factors of soil formation are so closely interrelated that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four.

Parent Material

Parent material is the unconsolidated mass of weathered geologic material from which a soil forms. It largely determines the chemical and mineralogical composition of the soil.

In Monroe County, soils on ridgetops and valley slopes formed in loess, in loess and residuum, or in colluvium and erosional deposits of limestone or sandstone. Atterberry and Downs soils formed entirely in loess. Reedsburg, Valton, and Wildale soils formed in loess and in the underlying clayey residuum of limestone. Dorerton soils formed in a loamy mantle of mixed loess and erosional deposits containing a large number of channery fragments. Brodale soils formed in loamy colluvium and residuum of limestone and calcareous sandstone. Gale and La Farge soils formed in loess and in the underlying sandy or loamy residuum of sandstone. Areas of Eleva and Norden soils that have steep and very steep slopes and the Urne soils formed in loamy residuum of sandstone. Norden soils on lesser slopes formed in a thin mantle of loess and in the underlying loamy residuum of sandstone. Boone soils formed in sandy residuum of sandstone.

Soils on valley slopes, stream terraces, toe slopes, and foot slopes of valleys formed in loess or in silty, loamy, or sandy deposits. Bertrand, Curran, Dells, and Jackson soils formed in loess or other silty deposits and in the underlying sandy deposits. Council soils formed in loamy deposits. Billett, Hoopeston, Meridian, and Shiffer soils formed in loamy deposits overlying sandy deposits. Au Gres, Impact, Meehan, and Tarr soils formed in thick sandy deposits weathered from sandstone.

Most soils on flood plains formed in alluvium or recent deposits. Abscota soils formed in sandy deposits. Boaz, Coffeen, and Ettrick soils formed in silty deposits. Ceresco soils formed in loamy and sandy deposits and Kickapoo soils in loamy deposits. Kato soils formed in silty deposits over sand.

Lacustrine deposits in Monroe County consist of clayey strata that were laid down in still waters of glacial lakes. Menasha soils formed in clayey deposits overlain by a thin mantle of silty deposits. Wautoma and Wyeville soils formed in sandy deposits and in the underlying clayey lacustrine deposits.

Organic material was the parent material for some soils in the county. It consisted mainly of herbaceous plants in advanced stages of decomposition. Dawson soils formed in 16 to 51 inches of organic material over sand, and Palms soils formed in 16 to 51 inches of organic material over loamy deposits. Houghton and Loxley soils formed in more than 51 inches of organic material.

Climate

Climatic factors have directly influenced the formation of soils. Monroe County has a continental climate characterized by long, cold winters and short but warm and humid summers. The sequence of wetting and drying and freezing and thawing weathers the parent material. Downward percolating waters leach plant nutrients and clay from the top layers of the soil and redeposit these materials at a greater depth. Before the soil was cleared and cultivated, prairie and woodland vegetation were competing for dominance in the soil-plant regime, but the humid climate of Monroe County favors woodland vegetation. Soils that form under woodland vegetation have a thin surface layer and generally are leached and acid. Cool temperatures inhibit bacterial breakdown of organic matter, thus promoting its accumulation. This results in a darkening of the surface layer.

Wind can affect the development of soil by adding loess or windblown sand. Climate can also have more localized effects. North- and east-facing slopes tend to be cooler and wetter than south- and west-facing slopes. Depressional areas may receive cooler temperatures and more moisture for a longer part of the year than ridgetops and valley slopes.

Plant and Animal Life

Living organisms are important factors in soil formation. Earthworms, ants, and rodents continually mix the soil. They bring subsoil materials to the surface and surface materials down into lower layers. They also help to keep the soil porous, thus enhancing air and water movement. Plants obtain nutrients from the soil, incorporate them into their tissues, and later release them as dead leaves and twigs fall to the soil surface. This recycles nutrients which were leached into the lower layers of the soil and adds organic matter to the surface. Bacteria and fungi decompose this organic matter.

The influence of different kinds of vegetation on the formation of soils is shown by the differences in color between soils that formed under trees and those that formed under prairie grasses. Norden soils, for example, formed under trees. They have a lighter colored or thinner surface layer than do soils that formed under grass, and they are generally more acid. The Hoopeston soil is an example of a soil which formed under grass. These soils have a thick, dark-colored surface layer. Soils that formed under grass accumulate more organic

matter and retain it longer than soils that formed under trees, and this organic matter contributes to their darker color. Soils that formed where the vegetation is a mixture of trees and grasses generally have characteristics of both woodland and grassland soils.

During the past 125 years, man has influenced the soils by disturbing and altering the soil-forming processes. Clearing, burning, and cultivating land have altered the original condition of many soils, and repeated removal of plant cover from terraces and uplands has accelerated erosion. Overcultivation has contributed to loss of organic matter, and the rate of water infiltration into the soil has been reduced by the use of heavy equipment and tillage of the soil when it is too wet. Overcultivation and the use of heavy equipment have also changed the loose, porous surface layer to clods.

When soils are well managed and suitable crop rotations are used, man's activities have not harmed the soils. Crop yields have gradually increased. Adding animal manure and planting grasses, such as bromegrass, have increased the content of organic matter in the surface layer and upper part of the subsoil beyond the level found in virgin woodland soils.

The addition of lime has altered the natural acidity of the soils. The lime not only has improved plant growth but has also created a more favorable environment for soil bacteria. The increased bacterial action, in turn, has hastened decomposition of the organic matter.

Adding fertilizers to the soil has increased the supply of plant nutrients, as has the planting of alfalfa, which with its long taproot transfers calcium and other plant food elements from the lower part of the subsoil and the substratum to the surface layer.

The drainage of some soils has been improved by the construction of waterways and water control structures. Draining the wetlands has permitted the cultivation of many high-potential soils but has contributed to a general lowering of the water table throughout the area.

Man's activity is evident in areas where the surface layer is now mostly brown subsoil exposed by erosion. This soil loss is also apparent in the over-thickened surface layer on foot slopes and along natural drainageways, where sediments washed from the surrounding soils are 2 to 3 feet thick or more. Ceresco, Coffeen, and Ettrick soils formed in such alluvial sediments.

Other changes caused by man's manipulation of the soil and landscape include the tendency toward more flash flooding where woodland cover is removed from the more sloping soils of the watershed; the rapid filling of lakes and reservoirs with sediments; the contamination of ground water by sewage effluent and fertilizer elements, especially nitrates; and the effect of pesticides on soil organisms and ground water. All of man's activities affect the soil in some way, but some of the changes will not be evident for many years.

Relief

The ridgetops, valleys, stream terraces, and lake basins of Monroe County have been formed by wind, rain, running water, and glacial melt water. Where bedrock controls the topography, the resistance or lack of resistance of the underlying rocks has determined the relief. Relief, in turn, influences soil formation by controlling drainage, runoff, and other direct or indirect effects of water, including erosion. In many places, the relief of a given soil can be correlated closely with the drainage, the thickness and organic matter content of the A1 horizon, the thickness of the solum, and the differentiation of horizons in the soil profile.

In Monroe County, the surface layer is generally light colored on the more sloping soils and successively darker colored and thicker on the less sloping soils and in areas where the slope changes from convex to concave. Where the slopes are more gentle, runoff is slower, and consequently more water soaks into the soil. As a result, plants grow better on the more gentle slopes and more organic matter accumulates in the A1 horizon. Also, surface material eroded from steep upper slopes accumulates on the lower, more gentle slopes.

Soil drainage is greatly affected by relief. Runoff water from sloping to very steep, excessively drained to well drained soils accumulates on the nearly level bottom slopes and flood plains, where the soils are mostly somewhat poorly drained to very poorly drained. Drainage characteristics are generally reflected in the color, degree, and kind of mottling or gleying in the soil. The well drained Bertrand, Norden, and Valton soils are dominantly free of mottles throughout the upper 60 inches. The moderately well drained Downs and Jackson soils have mottles in the lower part of the B horizon. Curran, Dells, and Shiffer soils are representative of the somewhat poorly drained soils in the county. They are mottled in the B and C horizons. Ettrick, Menasha, and Wautoma soils are representative of the poorly drained soils. They are gleyed and mottled below the A horizon.

Time

The effects of the soil forming factors are modified by time. The longer the factors have interacted, the more highly developed or mature the soil will be. Mature soils have well defined horizons of eluviation and illuviation.

Because of the time factor, the soils of Monroe County vary greatly. Those on flood plains, where new material is added regularly, and those on steep slopes of uplands, where material is eroded at rates approaching that at which new soil material is formed, are considered to be the youngest. Those soils on stream terraces are probably the next youngest. Those soils on broad ridgetops in the southern part of the county that formed in residuum of limestone are the oldest soils in the county and among the oldest in Wisconsin. They are believed to be as much as 24,000 years old.

Horizon Differentiation

Several physical and chemical processes are involved in the formation of horizons in the soils of Monroe County. These include the accumulation of organic matter, the leaching of lime carbonates, the formation and translocation of clay minerals, and the reduction and transfer of iron. Some processes promote horizon differentiation and others retard or otherwise affect horizon differentiation. The balance among the processes determines the nature of the soil at any given point (*6*). These processes are continually taking place, generally at the same time, throughout the solum. Because these processes are very slow, it takes hundreds to thousands of years for a soil to reach equilibrium with the environment.

Organic matter accumulates as plant residue decomposes. This process darkens the surface layer and helps to form the A1 horizon.

It is believed that lime and other soluble salts are leached before the translocation of clay minerals occurs. Many factors affect this leaching, such as the kinds of salts originally present, the depth to which the soil solution percolates, and the texture of the soil. Some soils are continually being recharged with lime carbonates by the movement of water up from underground sources. This process retards leaching and slows the formation of illuviated clay horizons. The leaching and recharging of lime carbonates and soluble salts have occurred in the somewhat poorly drained and poorly drained soils, such as those of the Atterberry, Ettrick, Houghton, and Palms series.

The most important process of soil-horizon formation in Monroe County is the formation and translocation of silicate clay minerals. The quantity of clay minerals in a soil depends on the inherent nature of the parent material, but the amount of clay in each horizon varies because of translocation. Clay minerals are generally eluviated from the A horizon and illuviated in the B horizon as clay films on faces of peds and in pores and root channels. In some soils, an A2 horizon has formed by considerable eluviation of clay minerals to the B horizon. La Farge soils are an example of soils in which clay minerals have been translocated.

The reduction and transfer of iron, a process called gleying, is associated mainly with the wetter soils. In the poorly drained soils, the subsoil and substratum are grayish colored and have mottles in the upper part of the subsoil, indicating such gleying. Ettrick, Kato, and Menasha soils are examples of gleyed soils. The moderately well drained and somewhat poorly drained soils have mottles at a greater depth than the poorly drained soils.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

Back slope. A geomorphic component of a hill slope that forms the steepest inclined surface and principal element of many hill slopes. Back slopes in profile are commonly steep, linear, and may or may not include cliff segments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Channery soil. A soil that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment. Very channery soils contain 35 to 65 percent of these fragments.

Cherty soil. A soil that is, by volume 15 to 35 percent gravel-size fragments of chert, which is a compact rock consisting essentially of cryptocrystalline quartz. Very cherty soils contain 35 to 60 percent of these fragments. A single piece is called a chert pebble.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey. General term for the texture classes clay, silty clay, and sandy clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth, soil. The depth to a root-impeding layer or horizon. In this publication, it is depth to bedrock. The soil is considered *moderately deep* if this depth is between 20 and 40 inches and *deep* if it is more than 40 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured soil. Sandy clay, silty clay, and clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glauconite. A complex potassium-iron-silicate disseminated as green flakes or grains in marine sedimentary rocks of all ages.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Head slopes. The geomorphic component of a hill slope that forms the concave surface at the head of a drainageway where the flow of water converges downward towards the center.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:
O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.
C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.
R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. In Monroe County, the only method of irrigation is—

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy. General term for the texture classes clay loam, sandy clay loam, loam, very fine sandy loam, fine sandy loam, and sandy loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Organic matter. Plant and animal residue in the soil in various stages of decomposition. In this survey area the content of organic matter is expressed as—

	Percent
Very low	less than 0.5
Low	0.5-1.0
Moderately slow	1.0-2.0
Moderate	2.0-4.0
High	4.0-8.0
Very high	8.0-16.0

Organic soil. A soil that contains more than 15 or 20 percent organic matter (depending on content of mineral matter) and is more than 16 inches thick.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridge. A long, narrow elevation of the land surface. Commonly, a ridge has a crest and steep sides, and forms an extended upland between valleys. Occasinally, a ridge may be flat, reflecting essentially flat-lying dolomite or limestone.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sandy. General term for the texture classes loamy fine sand, loamy sand, fine sand, and sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate

types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shoulder. The geomorphic component of a hill slope which makes up the transitional, generally convex surface between a back slope and a ridge.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. The slope classes in this survey area are *nearly level,* 0 to 2 percent, *gently sloping,* 2 to 6 percent, *sloping,* 6 to 12 percent, *moderately steep,* 12 to 20 percent, *steep,* 20 to 30 percent, and *very steep,* more than 30 percent. These slope classes are represented by the letters A, B, C, D, E, and F, respectively.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A1, A2, or A3) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A horizon. Includes all subdivisions of this horizon (A1, A2, and A3).

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tiers. Layers used to define the control section in the classification of organic soils. The organic material is divided arbitrarily into three tiers. The surface tier is the upper 12 inches, the subsurface tier is the next 24 inches, and the bottom tier is the lower 16 inches.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. Unconsolidates to poorly cemented deposits deposited by water, ice, or wind that partially or completely fill a valley.

Valley slope. The sloping to very steep surface between the valley bottom and ridge. Well-defined steep side slopes of valleys are called valley walls.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded during the period 1937-1959 at Sparta, Wisconsin]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	2 years in 10 will have an average-- Maximum temperature equal to or higher than--	2 years in 10 will have an average-- Minimum temperature equal to or lower than--	Average	1 year in 10 will have-- Less than--	1 year in 10 will have-- More than--	Average number of days with 0.1 inch or more	Average precipitation in the form of snow and sleet
	°F	°F	°F	°F	In	In	In		In
January---	27.2	6.4	20.9	11.6	.88	0.19	1.87	2	8.7
February--	31.0	9.3	23.6	17.0	.86	0.13	1.93	2	8.0
March-----	41.3	20.9	33.0	26.3	1.49	0.29	2.84	4	8.0
April-----	58.6	35.0	50.9	42.6	2.55	0.90	4.56	6	1.6
May-------	70.9	46.1	61.9	56.8	3.40	1.41	5.77	8	*
June------	79.1	56.2	70.3	65.2	4.64	2.25	8.76	8	0
July------	84.3	60.4	74.7	70.5	3.22	0.59	5.51	6	0
August----	82.8	59.0	73.9	68.5	3.20	0.94	7.91	6	0
September-	73.9	49.7	64.5	59.4	3.34	0.70	8.78	6	0
October---	63.0	38.9	54.2	47.5	1.86	0.15	4.75	4	1.3
November--	43.6	25.5	37.8	31.9	1.63	0.47	3.10	4	12.6
December--	31.5	13.9	26.0	16.8	0.97	0.19	1.75	3	20.6

* Trace, an amount too small to measure.

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1937-59 at Sparta, Wisconsin]

Probability	Temperature				
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:					
2 years in 10 later than--	April 7	April 16	April 26	May 5	May 21
4 years in 10 later than--	March 31	April 9	April 19	April 28	May 14
6 years in 10 later than--	March 24	April 2	April 12	April 22	May 8
8 years in 10 later than--	March 17	March 25	April 5	April 15	May 1
First freezing temperature in fall:					
2 years in 10 earlier than	Nov. 2	Oct. 24	Oct. 11	Sept. 26	Sept. 17
4 years in 10 earlier than	Nov. 10	Nov. 1	Oct. 19	Oct. 4	Sept. 24
6 years in 10 earlier than	Nov. 16	Nov. 7	Oct. 25	Oct. 11	Sept. 30
8 years in 10 earlier than	Nov. 24	Nov. 15	Nov. 2	Oct. 18	Oct. 7

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AbA	Abscota loamy sand, 0 to 3 percent slopes	555	0.1
AtA	Atterberry silt loam, 0 to 2 percent slopes	535	0.1
AtB	Atterberry silt loam, 2 to 6 percent slopes	700	0.1
BeB	Bertrand silt loam, 2 to 6 percent slopes	840	0.1
BeC2	Bertrand silt loam, 6 to 12 percent slopes, eroded	645	0.1
BlA	Billett sandy loam, 0 to 2 percent slopes	1,685	0.3
BlB	Billett sandy loam, 2 to 6 percent slopes	7,970	1.4
BlC	Billett sandy loam, 6 to 12 percent slopes	4,075	0.7
BlD2	Billett sandy loam, 12 to 20 percent slopes, eroded	810	0.1
BmA	Billett sandy loam, moderately well drained, 0 to 3 percent slopes	2,635	0.5
BnA	Boaz silt loam, 0 to 3 percent slopes	2,980	0.5
BoC	Boone sand, 6 to 12 percent slopes	6,455	1.1
BoF	Boone sand, 12 to 45 percent slopes	25,910	4.4
BpF	Boone-Rock outcrop complex, 30 to 70 percent slopes	305	0.1
BrF	Brodale flaggy very fine sandy loam, 45 to 80 percent slopes	1,430	0.2
CeA	Ceresco fine sandy loam, 0 to 3 percent slopes	8,670	1.5
CfA	Coffeen silt loam, 0 to 3 percent slopes	9,155	1.6
CnB	Council silt loam, 2 to 6 percent slopes	1,105	0.2
CnC	Council silt loam, 6 to 12 percent slopes	4,465	0.8
CnD	Council silt loam, 12 to 20 percent slopes	8,950	1.5
CnE	Council silt loam, 20 to 30 percent slopes	7,800	1.3
CuA	Curran silt loam, 0 to 3 percent slopes	1,915	0.3
Dc	Dawson peat	19,095	3.3
DdA	Dells silt loam, 0 to 3 percent slopes	1,115	0.2
DlA	Downs silt loam, 0 to 2 percent slopes	1,765	0.3
DlB	Downs silt loam, 2 to 6 percent slopes	12,385	2.1
DlC2	Downs silt loam, 6 to 12 percent slopes, eroded	17,305	3.0
DlD2	Downs silt loam, 12 to 20 percent slopes, eroded	8,585	1.5
ElC	Eleva sandy loam, 6 to 12 percent slopes	1,135	0.2
ElD	Eleva sandy loam, 12 to 20 percent slopes	1,195	0.2
ElE	Eleva sandy loam, 20 to 45 percent slopes	13,975	2.4
Et	Ettrick silt loam	4,965	0.8
GaC	Gale silt loam, 6 to 12 percent slopes	1,095	0.2
GaD	Gale silt loam, 12 to 20 percent slopes	1,330	0.2
HpA	Hoopeston sandy loam, 0 to 3 percent slopes	2,860	0.5
Hu	Houghton muck	2,280	0.4
ImA	Impact sand, 0 to 2 percent slopes	4,270	0.7
ImB	Impact sand, 2 to 6 percent slopes	11,070	1.9
IpA	Impact sand, moderately well drained, 0 to 3 percent slopes	10,645	1.8
JaA	Jackson silt loam, 0 to 2 percent slopes	915	0.2
JaB	Jackson silt loam, 2 to 6 percent slopes	1,100	0.2
Ka	Kato silt loam	1,760	0.3
KpA	Kickapoo fine sandy loam, 0 to 3 percent slopes	7,245	1.2
LfC2	La Farge silt loam, 4 to 12 percent slopes, eroded	9,375	1.6
LfD2	La Farge silt loam, 12 to 20 percent slopes, eroded	10,755	1.8
Lw	Lows sandy loam	1,400	0.2
Lx	Loxley mucky peat	4,640	0.8
MaA	Meehan and Au Gres sands, 0 to 3 percent slopes	16,385	2.8
Mb	Menasha silty clay loam	1,425	0.2
MdA	Meridian loam, 0 to 2 percent slopes	1,525	0.3
MdB	Meridian loam, 2 to 6 percent slopes	2,405	0.4
Ne	Newson loamy sand	22,805	3.9
NlC2	Norden silt loam, 4 to 12 percent slopes, eroded	2,545	0.4
NlD2	Norden silt loam, 12 to 20 percent slopes, eroded	6,200	1.1
NuF	Norden, Urne, and Dorerton soils, 20 to 45 percent slopes	96,755	16.7
Pa	Palms muck	1,645	0.3
Pd	Pits	760	0.1
Pm	Psammaquents, nearly level	1,295	0.2
Ps	Psamments, nearly level	605	0.1
RbA	Reedsburg silt loam, 0 to 2 percent slopes	1,475	0.3
RbB	Reedsburg silt loam, 2 to 6 percent slopes	2,910	0.5
SfA	Shiffer loam, 0 to 3 percent slopes	1,330	0.2
TrB	Tarr sand, 0 to 6 percent slopes	37,145	6.3
TrC	Tarr sand, 6 to 12 percent slopes	29,085	5.0
TrD	Tarr sand, 12 to 20 percent slopes	4,170	0.7
TrE	Tarr sand, 20 to 45 percent slopes	1,315	0.2
TsA	Tarr sand, moderately well drained, 0 to 3 percent slopes	15,330	2.6
UfC2	Urne fine sandy loam, 4 to 12 percent slopes, eroded	1,755	0.3
UfD2	Urne fine sandy loam, 12 to 20 percent slopes, eroded	3,200	0.5
VaB	Valton silt loam, 2 to 6 percent slopes	8,405	1.4
VaC2	Valton silt loam, 6 to 12 percent slopes, eroded	19,935	3.4
VaD2	Valton silt loam, 12 to 20 percent slopes, eroded	14,870	2.5

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
VwE	Valton-Wildale silt loams, 20 to 45 percent slopes	3,885	0.7
Wa	Wautoma sand	4,095	0.7
WdB	Wildale silt loam, 2 to 6 percent slopes	5,410	0.9
WdC2	Wildale cherty silt loam, 6 to 12 percent slopes, eroded	9,480	1.6
WdD2	Wildale cherty silt loam, 12 to 20 percent slopes, eroded	5,050	0.9
WeA	Wyeville loamy sand, 0 to 3 percent slopes	5,785	1.0
	Water <40 acres	4,130	0.7
	Water >40 acres	320	0.1
	Total	585,280	100.0

TABLE 4.--PRIME FARMLAND

[Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name]

Map symbol	Soil name
AtA	Atterberry silt loam, 0 to 2 percent slopes (where drained)
AtB	Atterberry silt loam, 2 to 6 percent slopes (where drained)
BeB	Bertrand silt loam, 2 to 6 percent slopes
BlA	Billett sandy loam, 0 to 2 percent slopes
BlB	Billett sandy loam, 2 to 6 percent slopes
BmA	Billett sandy loam, moderately well drained, 0 to 3 percent slopes
BnA	Boaz silt loam, 0 to 3 percent slopes (where drained)
CeA	Ceresco fine sandy loam, 0 to 3 percent slopes (where drained)
CfA	Coffeen silt loam, 0 to 3 percent slopes (where drained)
CnB	Council silt loam, 2 to 6 percent slopes
CuA	Curran silt loam, 0 to 3 percent slopes (where drained)
DdA	Dells silt loam, 0 to 3 percent slopes (where drained)
DlA	Downs silt loam, 0 to 2 percent slopes
DlB	Downs silt loam, 2 to 6 percent slopes
Et	Ettrick silt loam (where protected from flooding and drained)
HpA	Hoopeston sandy loam, 0 to 3 percent slopes (where drained)
JaA	Jackson silt loam, 0 to 2 percent slopes
JaB	Jackson silt loam, 2 to 6 percent slopes
Ka	Kato silt loam (where drained and protected from flooding)
KpA	Kickapoo fine sandy loam, 0 to 3 percent slopes
Lw	Lows sandy loam (where drained)
Mb	Menasha silty clay loam (where drained)
MdA	Meridian loam, 0 to 2 percent slopes
MdB	Meridian loam, 2 to 6 percent slopes
RbA	Reedsburg silt loam, 0 to 2 percent slopes (where drained)
RbB	Reedsburg silt loam, 2 to 6 percent slopes (where drained)
SfA	Shiffer loam, 0 to 3 percent slopes (where drained)
VaB	Valton silt loam, 2 to 6 percent slopes
WdB	Wildale silt loam, 2 to 6 percent slopes

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Corn silage	Oats	Grass-legume hay*	Kentucky bluegrass	Soybeans
	Bu	Ton	Bu	Ton	AUM**	Bu
AbA------------------------ Abscota	---	---	---	3.0	2.1	---
AtA------------------------ Atterberry	130	22	80	5.5	5.0	44
AtB------------------------ Atterberry	130	22	80	5.5	4.8	44
BeB------------------------ Bertrand	125	21	80	5.5	4.0	42
BeC2----------------------- Bertrand	115	19	75	5.0	3.5	35
BlA, BlB------------------- Billett	80	13	55	3.5	3.3	28
BlC------------------------ Billett	75	10	50	3.0	2.5	24
BlD2----------------------- Billett	---	---	40	2.5	2.0	---
BmA------------------------ Billett	80	13	65	3.5	3.5	30
BnA------------------------ Boaz	100	18	75	4.5	4.5	30
BoC------------------------ Boone	---	---	---	1.5	1.4	---
BoF------------------------ Boone	---	---	---	---	1.0	---
BpF------------------------ Boone-Rock outcrop	---	---	---	---	---	---
BrF------------------------ Brodale	---	---	---	---	0.6	---
CeA------------------------ Ceresco	95	16	70	3.8	4.0	28
CfA------------------------ Coffeen	120	20	80	4.1	5.0	40
CnB------------------------ Council	115	19	80	5.5	4.3	40
CnC------------------------ Council	110	18	75	5.0	4.0	36
CnD------------------------ Council	100	16	70	4.5	3.4	---
CnE------------------------ Council	---	---	---	3.5	3.0	---
CuA------------------------ Curran	115	19	80	4.5	4.3	38

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Grass-legume hay*	Kentucky bluegrass	Soybeans
	Bu	Ton	Bu	Ton	AUM**	Bu
Dc------------------------ Dawson	---	---	---	---	---	---
DdA----------------------- Dells	90	15	75	4.5	4.0	32
DlA----------------------- Downs	130	22	90	5.6	4.7	43
DlB----------------------- Downs	130	22	80	5.5	4.7	43
DlC2---------------------- Downs	125	21	75	5.4	4.3	42
DlD2---------------------- Downs	115	18	60	5.0	4.0	---
ElC----------------------- Eleva	75	12	65	4.0	2.7	27
ElD----------------------- Eleva	65	11	60	4.0	2.4	---
ElE----------------------- Eleva	---	---	---	---	1.8	---
Et------------------------ Ettrick	140	24	85	5.5	4.8	45
GaC----------------------- Gale	85	13	70	4.0	3.0	28
GaD----------------------- Gale	75	12	60	3.5	2.6	---
HpA----------------------- Hoopeston	80	13	60	3.5	3.3	---
Hu------------------------ Houghton	115	20	---	---	---	---
ImA, ImB------------------ Impact	---	---	35	2.0	1.0	---
IpA----------------------- Impact	45	7	45	2.5	1.5	---
JaA----------------------- Jackson	120	20	80	5.5	4.3	38
JaB----------------------- Jackson	120	20	80	5.5	4.1	36
Ka------------------------ Kato	90	14	75	3.5	3.5	32
KpA----------------------- Kickapoo	90	15	70	4.0	3.1	32
LfC2---------------------- La Farge	90	15	70	4.5	4.0	32
LfD2---------------------- La Farge	80	12	55	4.5	3.7	---
Lw------------------------ Lows	80	12	70	3.0	2.5	28

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Grass-legume hay*	Kentucky bluegrass	Soybeans
	Bu	Ton	Bu	Ton	AUM**	Bu
Lx Loxley	---	---	---	---	3.3	---
MaA Meehan and Au Gres	50	8	50	2.4	1.5	22
Mb Menasha	90	14	70	4.5	4.0	32
MdA Meridian	90	15	70	2.8	3.5	32
MdB Meridian	85	13	70	2.5	3.3	28
Ne Newson	---	---	---	---	1.5	---
NlC2 Norden	85	14	70	4.5	4.0	30
NlD2 Norden	75	12	60	4.5	3.8	---
NuF Norden, Urne and Dorerton	---	---	---	---	---	---
Pa Palms	105	17	65	3.0	3.5	---
Pd. Pits						
Pm. Psammaquents						
Ps. Psamments						
RbA Reedsburg	100	18	70	4.5	4.3	34
RbB Reedsburg	95	17	65	4.5	4.3	34
SfA Shiffer	80	12	75	4.0	3.3	30
TrB Tarr	40	6	40	2.0	1.1	18
TrC, TrD Tarr	---	---	---	---	0.7	---
TrE Tarr	---	---	---	---	0.3	---
TsA Tarr	45	7	45	2.5	1.3	20
UfC2 Urne	70	11	70	4.0	2.8	28
UfD2 Urne	50	10	50	3.0	2.5	---
VaB Valton	100	17	75	5.0	3.7	34

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Grass-legume hay*	Kentucky bluegrass	Soybeans
	Bu	Ton	Bu	Ton	AUM**	Bu
VaC2 Valton	95	16	70	4.5	3.2	29
VaD2 Valton	80	12	50	3.0	2.7	---
VwE Valton-Wildale	---	---	---	---	2.5	---
Wa Wautoma	---	---	---	---	1.3	---
WdB Wildale	90	14	80	4.8	3.6	31
WdC2 Wildale	85	13	75	4.5	3.3	28
WdD2 Wildale	75	11	65	4.2	3.0	---
WeA Wyeville	60	10	60	3.5	3.3	22

* Grass-legume hay yields are for bromegrass-alfalfa mixture, except for wet soils, which are rated for red clover and timothy mixture.
** Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	2,680	---	---	---	---
II	64,840	35,260	28,055	1,525	---
III	112,585	71,810	28,485	12,290	---
IV	156,345	60,945	16,385	79,015	---
V	---	---	---	---	---
VI	208,590	122,415	50,635	35,540	---
VII	33,130	---	---	33,130	---
VIII	---	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
AbA Abscota	2s	Slight	Slight	Moderate	Slight	Northern red oak White ash Silver maple	66 --- ---	Eastern white pine, red pine.
AtA, AtB Atterberry	2o	Slight	Slight	Slight	Slight	Northern red oak White oak Silver maple White ash Green ash	65 --- --- 65 ---	Eastern white pine, red pine, white spruce.
BeB, BeC2 Bertrand	1o	Slight	Slight	Slight	Slight	Northern red oak White ash White oak Bur oak	70+ --- --- ---	Red pine, eastern white pine, white spruce, black walnut.
BlA, BlB, BlC Billett	3o	Slight	Slight	Slight	Slight	Northern red oak Black oak White oak Northern pin oak Shagbark hickory	60 --- --- --- ---	Red pine, eastern white pine, white spruce, Norway spruce.
BlD2 Billett	3r	Moderate	Moderate	Moderate	Slight	Northern red oak Black oak White oak Northern pin oak Shagbark hickory	60 --- --- --- ---	Red pine, eastern white pine, white spruce, Norway spruce.
BmA Billett	3o	Slight	Slight	Slight	Slight	Northern red oak White oak Black oak Northern pin oak Shagbark hickory	60 --- --- --- ---	Red pine, eastern white pine, white spruce, Norway spruce.
BnA Boaz	3o	Slight	Slight	Slight	Slight	Silver maple Red maple White ash Green ash	80 --- --- ---	Silver maple, red maple, white ash, green ash, white spruce.
BoC Boone	4s	Slight	Slight	Severe	Slight	Northern pin oak Jack pine Black oak	44 49 ---	Red pine, jack pine.
BoF Boone	4s	Moderate	Severe	Severe	Slight	Northern pin oak Jack pine Black oak	44 49 ---	Red pine, jack pine.
BpF*:								
Boone	4s	Severe	Severe	Severe	Slight	Northern pin oak Jack pine Black oak	44 49 ---	Red pine, jack pine.
Rock outcrop.								

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
CeA----------------- Ceresco	2o	Slight	Slight	Slight	Slight	Northern red oak---- White ash----------- Red maple----------- Silver maple--------	66 --- --- ---	Eastern white pine, white spruce, Carolina poplar.
CfA----------------- Coffeen	2o	Slight	Slight	Slight	Slight	Silver maple-------- White ash-----------	90 65	Red maple, silver maple, white spruce, white ash.
CnB, CnC----------- Council	2o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple--------- Red maple----------- American basswood--- Paper birch--------- Quaking aspen-------	66 --- --- --- --- ---	Red pine, eastern white pine, white spruce, Norway spruce.
CnD, CnE----------- Council	2r	Moderate	Moderate	Slight	Slight	Northern red oak---- Sugar maple--------- Red maple----------- American basswood--- Paper birch--------- Quaking aspen-------	66 --- --- --- --- ---	Red pine, eastern white pine, white spruce, Norway spruce.
CuA----------------- Curran	3o	Slight	Slight	Slight	Slight	Red maple----------- White ash----------- Quaking aspen------- Silver maple--------	55 --- --- ---	White spruce, white ash, red maple.
DdA----------------- Dells	3o	Slight	Slight	Slight	Slight	Silver maple-------- Northern red oak---- White ash-----------	80 --- ---	Silver maple, white ash, white spruce.
DlA, DlB, DlC2----- Downs	2o	Slight	Slight	Slight	Slight	White oak----------- Northern red oak----	65 65	Eastern white pine, red pine, Norway spruce, white spruce, black walnut.
DlD2--------------- Downs	2r	Moderate	Moderate	Slight	Slight	White oak----------- Northern red oak----	65 65	Eastern white pine, red pine, Norway spruce, white spruce, black walnut.
ElC----------------- Eleva	4o	Slight	Slight	Slight	Slight	Black oak----------- Jack pine----------- Northern pin oak---- Northern red oak----	45 --- --- ---	Jack pine, red pine.
ElD----------------- Eleva	4r	Moderate	Moderate	Slight	Slight	Black oak----------- Jack pine----------- Northern pin oak---- Northern red oak----	45 --- --- ---	Jack pine, red pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
ElE----------------- Eleva	4r	Severe	Severe	Slight	Slight	Black oak-----------	45	Jack pine, red pine.
						Jack pine-----------	---	
						Northern pin oak----	---	
						Northern red oak----	---	
Et------------------ Ettrick	4w	Slight	Severe	Severe	Moderate	Silver maple--------	74	Silver maple, red maple, white ash, green ash, white spruce.
						Green ash-----------	---	
						American basswood---	---	
						Red maple-----------	---	
						Northern red oak----	---	
GaC----------------- Gale	2o	Slight	Slight	Slight	Slight	Northern red oak----	69	Red pine, eastern white pine, white spruce.
						Sugar maple---------	---	
						White oak-----------	---	
GaD----------------- Gale	2r	Moderate	Moderate	Slight	Slight	Northern red oak----	69	Red pine, eastern white pine, white spruce.
						Sugar maple---------	---	
						White oak-----------	---	
Hu------------------ Houghton	3w	Slight	Severe	Severe	Severe	Tamarack------------	48	
						Red maple-----------	---	
						Silver maple--------	---	
						White ash-----------	---	
						Quaking aspen-------	---	
						Green ash-----------	---	
						Northern white-cedar	---	
ImA, ImB, IpA------ Impact	3s	Slight	Slight	Severe	Slight	Jack pine-----------	52	Red pine, jack pine, Norway spruce.
						Northern pin oak----	---	
JaA, JaB----------- Jackson	1o	Slight	Slight	Slight	Slight	Northern red oak----	71	Red pine, eastern white pine, white spruce, black walnut.
						White ash-----------	---	
						White oak-----------	---	
						Bur oak-------------	---	
						Black walnut--------	---	
KpA----------------- Kickapoo	3o	Slight	Slight	Slight	Slight	Northern red oak----	55	Red pine, eastern white pine, white spruce, white ash, silver maple.
						Sugar maple---------	---	
						American basswood---	---	
LfC2---------------- La Farge	2o	Slight	Slight	Slight	Slight	Northern red oak----	65	Eastern white pine, red pine.
						Black oak-----------	---	
						White oak-----------	---	
						Shagbark hickory----	---	
						American basswood---	---	
LfD2---------------- La Farge	2r	Moderate	Moderate	Slight	Slight	Northern red oak----	65	Eastern white pine, red pine.
						Black oak-----------	---	
						White oak-----------	---	
						Shagbark hickory----	---	
						American basswood---	---	
Lw------------------ Lows	3w	Slight	Severe	Moderate	Moderate	Silver maple--------	80	Silver maple, red maple, green ash, white ash, white spruce.
						White ash-----------	---	
						Green ash-----------	---	
						Red maple-----------	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
MaA*:								
Meehan	3s	Slight	Slight	Moderate	Slight	Jack pine	55	Eastern white pine, jack pine, white spruce, red maple.
						Northern pin oak	66	
						Paper birch	67	
						Eastern white pine	---	
						Quaking aspen	66	
						Red maple	---	
Au Gres	3s	Slight	Slight	Severe	Slight	Red pine	58	White spruce, Carolina poplar, eastern white pine, northern white-cedar, Norway spruce.
						Northern pin oak	60	
						Quaking aspen	---	
						Balsam fir	---	
						Paper birch	---	
						Eastern white pine	---	
						White spruce	---	
Mb: Menasha	2w	Slight	Moderate	Severe	Moderate	White ash	65	Red maple, silver maple, white ash, green ash, white spruce.
						Red maple	78	
						Silver maple	79	
						Swamp white oak	---	
						Northern red oak	---	
						American elm	---	
						Green ash	---	
						American basswood	---	
MdA, MdB: Meridian	2o	Slight	Slight	Slight	Slight	Northern red oak	68	Red pine, eastern white pine, white spruce.
						Sugar maple	---	
						American basswood	---	
						White ash	---	
						White oak	---	
Ne: Newson	4w	Slight	Severe	Severe	Slight	Quaking aspen	50	Eastern white pine, white spruce.
						Paper birch	---	
						Eastern white pine	---	
NlC2: Norden	2o	Slight	Slight	Slight	Slight	Northern red oak	63	Red pine, eastern white pine, jack pine.
						Black oak	---	
						White oak	---	
						Sugar maple	---	
						Quaking aspen	---	
NlD2: Norden	2r	Moderate	Moderate	Slight	Slight	Northern red oak	63	Red pine, eastern white pine, jack pine.
						Black oak	---	
						White oak	---	
						Sugar maple	---	
						Quaking aspen	---	
NuF*:								
Norden	2r	Moderate	Moderate	Slight	Slight	Northern red oak	63	Red pine, eastern white pine, jack pine.
						Black oak	---	
						White oak	---	
						Sugar maple	---	
						Quaking aspen	---	
Urne	3r	Severe	Severe	Moderate	Slight	Northern red oak	60	Red pine, eastern white pine, white spruce.
						White oak	---	
						Black oak	---	
						Shagbark hickory	---	
						White ash	---	
Dorerton	4f	Moderate	Severe	Moderate	Slight	Northern red oak	45	Northern red oak, eastern white pine, white spruce, black walnut, red pine, white oak.
						Eastern white pine	50	
						White oak	---	
						Bur oak	---	
						American basswood	---	
						Black cherry	---	
						Quaking aspen	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Trees to plant
Pa------------------ Palms	3w	Slight	Severe	Severe	Severe	Silver maple-------- Red maple----------- White ash----------- Quaking aspen------- Northern white-cedar Tamarack------------ Black ash-----------	80 --- --- --- --- --- ---	
RbA, RbB----------- Reedsburg	2o	Slight	Slight	Slight	Slight	Northern red oak---- Black oak----------- White oak-----------	60 --- ---	Eastern white pine, red pine, white spruce.
SfA---------------- Shiffer	3o	Slight	Slight	Slight	Slight	Silver maple-------- Green ash-----------	80 ---	Silver maple, red maple, white ash, green ash, white spruce.
TrB, TrC----------- Tarr	3s	Slight	Slight	Moderate	Slight	Eastern white pine-- Red pine------------ Jack pine----------- Northern pin oak----	57 --- --- ---	Red pine, eastern white pine, jack pine.
TrD---------------- Tarr	3s	Moderate	Severe	Moderate	Slight	Eastern white pine-- Red pine------------ Jack pine----------- Northern pin oak----	57 --- --- ---	Red pine, eastern white pine, jack pine.
TrE---------------- Tarr	3s	Severe	Severe	Severe	Slight	Eastern white pine-- Red pine------------ Jack pine----------- Northern pin oak----	57 --- --- ---	Red pine, eastern white pine, jack pine.
TsA---------------- Tarr	3s	Slight	Slight	Moderate	Slight	Eastern white pine-- Red pine------------ Jack pine----------- Northern pin oak----	57 --- --- ---	Red pine, eastern white pine, jack pine.
UfC2--------------- Urne	3o	Slight	Slight	Slight	Slight	Northern red oak---- White oak----------- Black oak----------- Shagbark hickory---- White ash-----------	60 --- --- --- ---	Red pine, eastern white pine, white spruce.
UfD2--------------- Urne	3r	Moderate	Moderate	Slight	Slight	Northern red oak---- White oak----------- Black oak----------- Shagbark hickory---- White ash-----------	60 --- --- --- ---	Red pine, eastern white pine, white spruce.
VaB, VaC2---------- Valton	2o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple--------- American basswood---	68 --- ---	Eastern white pine, red pine, white spruce.
VaD2--------------- Valton	2r	Moderate	Moderate	Slight	Slight	Northern red oak---- Sugar maple--------- American basswood---	68 --- ---	Eastern white pine, red pine, white spruce.
VwE*:								
Valton------------	2r	Moderate	Moderate	Slight	Slight	Northern red oak---- Sugar maple--------- American basswood---	68 --- ---	Eastern white pine, red pine, white spruce.
Wildale-----------	3c	Severe	Severe	Moderate	Moderate	Northern red oak---- Red maple----------- White oak----------- Quaking aspen-------	58 --- --- ---	Red pine, eastern white pine, white spruce, Norway spruce.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Trees to plant
Wa----------------- Wautoma	4w	Slight	Severe	Moderate	Moderate	Red maple-----------	45	Red maple, silver maple, white ash, green ash.
						Silver maple--------	---	
						White ash-----------	---	
						Green ash-----------	---	
WdB, WdC2---------- Wildale	3c	Slight	Slight	Moderate	Moderate	Northern red oak----	58	Red pine, eastern white pine, white spruce, Norway spruce.
						Red maple-----------	---	
						White oak-----------	---	
						Quaking aspen-------	---	
WdD2--------------- Wildale	3c	Moderate	Moderate	Moderate	Moderate	Northern red oak----	58	Red pine, eastern white pine, white spruce, Norway spruce.
						Red maple-----------	---	
						White oak-----------	---	
						Quaking aspen-------	---	
WeA---------------- Wyeville	2s	Slight	Slight	Moderate	Slight	Northern pin oak----	59	Red maple, silver maple, green ash, white ash.
						Red maple-----------	---	
						Silver maple--------	---	
						Green ash-----------	---	
						White ash-----------	---	
						Jack pine-----------	62	
						Bur oak-------------	---	
						Eastern white pine--	---	
						Quaking aspen-------	---	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

[The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil]

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
AbA---------------- Abscota	---	Nannyberry viburnum, redosier dogwood, silky dogwood, American cranberrybush, lilac, northern white-cedar.	White spruce------	Silver maple, white ash, green ash, red maple.	Carolina poplar.
AtA, AtB---------- Atterberry	---	Northern white-cedar, American cranberrybush, lilac, silky dogwood.	White spruce------	Eastern white pine, red pine, red maple, silver maple, white ash, green ash.	---
BeB, BeC2--------- Bertrand	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
BlA, BlB, BlC, BlD2------------- Billett	---	Northern white-cedar, silky dogwood, lilac, American cranberrybush, Amur maple, gray dogwood.	Norway spruce, white ash.	Eastern white pine, red pine, white spruce, red maple.	---
BmA---------------- Billett	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, gray dogwood, silky dogwood.	Norway spruce, white ash.	Eastern white pine, white spruce, red maple, red pine.	---
BnA---------------- Boaz	---	Northern white-cedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood, common ninebark.	White spruce------	Silver maple, white ash, green ash, red maple.	---
BoC, BoF---------- Boone	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
BpF*:					
Boone--------------	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BpF*: Rock outcrop.					
BrF. Brodale					
CeA: Ceresco	---	Northern white-cedar, silky dogwood, American cranberrybush, Amur privet.	White spruce, Siberian crab-apple.	Eastern white pine, green ash, white ash, red maple.	Carolina poplar.
CfA: Coffeen	---	Silky dogwood, Amur privet, American cranberrybush, Northern white-cedar.	White spruce, Norway spruce.	White ash, green ash, red maple, silver maple.	Carolina poplar.
CnB, CnC, CnD, CnE: Council	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
CuA: Curran	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
Dc. Dawson					
DdA: Dells	---	Northern white-cedar, lilac, Amur maple, silky dogwood, American cranberrybush, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
DlA, DlB, DlC2, DlD2: Downs	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
ElC, ElD, ElE: Eleva	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce.	Eastern white pine, red pine, jack pine.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Et----------------- Ettrick	---	Northern white-cedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood, common ninebark.	White spruce------	Silver maple, white ash, green ash, red maple.	---
GaC, GaD---------- Gale	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
HpA---------------- Hoopeston	---	Siberian crabapple, Siberian peashrub, lilac, silky dogwood, common ninebark.	White spruce, Norway spruce.	Green ash, white ash, red maple, silver maple.	---
Hu----------------- Houghton	---	Silky dogwood, redosier dogwood, common ninebark.	Manchurian crabapple, Japanese tree lilac.	---	Carolina poplar.
ImA, ImB, IpA----- Impact	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
JaA, JaB---------- Jackson	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
Ka----------------- Kato	---	Northern white-cedar, silky dogwood, redosier dogwood, nanny-berry viburnum.	White spruce------	Green ash, silver maple, white ash, red maple.	Carolina poplar.
KpA---------------- Kickapoo	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
LfC2, LfD2-------- La Farge	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
Lw: Lows	---	Northern white-cedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood, common ninebark.	White spruce	Silver maple, white ash, green ash, red maple.	---
Lx. Loxley					
MaA*:					
Meehan	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---
Au Gres	---	Silky dogwood, American cranberrybush, nannyberry viburnum, northern white-cedar.	Manchurian crabapple, white spruce.	Eastern white pine, red pine, white ash, red maple, silver maple.	Carolina poplar.
Mb: Menasha	---	Northern white-cedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood, common ninebark.	White spruce	Silver maple, white ash, green ash, red maple.	---
MdA, MdB: Meridian	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
Ne. Newson					
NlC2, NlD2: Norden	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
NuF*:					
Norden	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---
Urne	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---
Dorerton.					
Pa Palms	---	Silky dogwood, American cranberrybush, redosier dogwood, common ninebark.	Manchurian crabapple, Japanese tree lilac.	---	Carolina poplar.
Pd*. Pits					
Pm*. Psammaquents					
Ps*. Psamments					
RbA, RbB Reedsburg	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
SfA Shiffer	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
TrB, TrC, TrD, TrE, TsA Tarr	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
UfC2, UfD2: Urne	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---
VaB, VaC2, VaD2: Valton	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
VwE*:					
Valton	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
Wildale	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
Wa. Wautoma					
WdB, WdC2, WdD2: Wildale	---	Northern white-cedar, lilac, American cranberrybush, Amur maple, silky dogwood, gray dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine, white ash, red maple.	---
WeA: Wyeville	Manyflower cotoneaster.	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AbA: Abscota	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding, droughty.
AtA, AtB: Atterberry	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
BeB: Bertrand	Slight	Slight	Moderate: slope.	Slight	Slight.
BeC2: Bertrand	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
BlA: Billett	Slight	Slight	Slight	Slight	Slight.
BlB: Billett	Slight	Slight	Moderate: slope.	Slight	Slight.
BlC: Billett	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
BlD2: Billett	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
BmA: Billett	Slight	Slight	Slight	Slight	Slight.
BnA: Boaz	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
BoC: Boone	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
BoF: Boone	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.	Severe: droughty, slope.
BpF*:					
Boone	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.	Severe: droughty, slope.
Rock outcrop.					
BrF: Brodale	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope, small stones.	Severe: small stones, droughty, slope.
CeA: Ceresco	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty, flooding.
CfA: Coffeen	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
CnB: Council	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CnC: Council	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CnD: Council	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CnE: Council	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CuA: Curran	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Dc: Dawson	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
DdA: Dells	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
DlA: Downs	Slight	Slight	Slight	Slight	Slight.
DlB: Downs	Slight	Slight	Moderate: slope.	Slight	Slight.
DlC2: Downs	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
DlD2: Downs	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
ElC: Eleva	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
ElD: Eleva	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
ElE: Eleva	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Et: Ettrick	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
GaC: Gale	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
GaD: Gale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
HpA: Hoopeston	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Hu: Houghton	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.
ImA, ImB, IpA: Impact	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
JaA: Jackson	Slight	Slight	Slight	Slight	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
JaB------------------ Jackson	Slight----------	Slight----------	Moderate: slope.	Slight------------	Slight.
Ka------------------- Kato	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding.
KpA------------------ Kickapoo	Severe: flooding.	Slight----------	Moderate: flooding.	Slight------------	Moderate: flooding.
LfC2----------------- La Farge	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
LfD2----------------- La Farge	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Lw------------------- Lows	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Lx------------------- Loxley	Severe: ponding, excess humus, too acid.	Severe: ponding, excess humus, too acid.	Severe: excess humus, ponding, too acid.	Severe: ponding, excess humus.	Severe: too acid, ponding, excess humus.
MaA*:					
Meehan---------------	Severe: too sandy, wetness.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Moderate: wetness, droughty, too sandy.
Au Gres--------------	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Moderate: wetness, droughty, too sandy.
Mb------------------- Menasha	Severe: flooding, ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MdA------------------ Meridian	Slight----------	Slight----------	Slight----------	Slight------------	Slight.
MdB------------------ Meridian	Slight----------	Slight----------	Moderate: slope.	Slight------------	Slight.
Ne------------------- Newson	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
NlC2----------------- Norden	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight------------	Moderate: slope, thin layer.
NlD2----------------- Norden	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
NuF*:					
Norden---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urne-----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
NuF*:					
Dorerton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pa Palms	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Pd*. Pits					
Pm*. Psammaquents					
Ps*. Psamments					
RbA, RbB Reedsburg	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Slight	Moderate: wetness.
SfA Shiffer	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
TrB Tarr	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
TrC Tarr	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope, too sandy.
TrD Tarr	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: slope.
TrE Tarr	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.	Severe: slope.
TsA Tarr	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
UfC2 Urne	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
UfD2 Urne	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
VaB Valton	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
VaC2 Valton	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
VaD2 Valton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
VwE*:					
Valton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
VwE*:					
Wildale	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope, erodes easily.	Severe: slope.
Wa: Wautoma	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding.
WdB: Wildale	Moderate: small stones, percs slowly.	Moderate: small stones, percs slowly.	Severe: small stones.	Severe: erodes easily.	Moderate: small stones, large stones.
WdC2: Wildale	Moderate: slope, small stones, percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: slope, small stones.	Severe: erodes easily.	Moderate: small stones, large stones, slope.
WdD2: Wildale	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: erodes easily.	Severe: slope.
WeA: Wyeville	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
AbA----------------- Abscota	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
AtA----------------- Atterberry	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
AtB----------------- Atterberry	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
BeB----------------- Bertrand	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BeC2---------------- Bertrand	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BlA, BlB------------ Billett	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BlC----------------- Billett	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BlD2---------------- Billett	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BmA----------------- Billett	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BnA----------------- Boaz	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good.
BoC----------------- Boone	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
BoF----------------- Boone	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
BpF*:										
Boone---------------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
BrF----------------- Brodale	Poor	Fair	Fair	Fair	Fair	Very poor.	Veqy poor.	Poor	Poor	Very poor.
CeA----------------- Ceresco	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
CfA----------------- Coffeen	Fair	Fair	Fair	Good	Poor	Fair	Poor	Fair	Good	Poor.
CnB----------------- Council	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CnC, CnD------------ Council	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CnE----------------- Council	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CuA----------------- Curran	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Dc----------------- Dawson	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
DdA---------------- Dells	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
DlA, DlB----------- Downs	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
DlC2, DlD2--------- Downs	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ElC---------------- Eleva	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
ElD---------------- Eleva	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
ElE---------------- Eleva	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Et----------------- Ettrick	Good	Good	Fair	Good	Fair	Good	Good	Good	Good	Good.
GaC---------------- Gale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GaD---------------- Gale	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HpA---------------- Hoopeston	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
Hu----------------- Houghton	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
ImA, ImB, IpA------ Impact	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
JaA, JaB----------- Jackson	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ka----------------- Kato	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
KpA---------------- Kickapoo	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
LfC2--------------- La Farge	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LfD2--------------- La Farge	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lw----------------- Lows	Fair	Good	Good	Good	Fair	Good	Good	Good	Good	Good.
Lx----------------- Loxley	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
MaA*:										
Meehan-------------	Poor	Fair	Good	Fair	Fair	Fair	Poor	Poor	Fair	Poor.
Au Gres------------	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Mb----------------- Menasha	Good	Fair	Fair	Good	Fair	Good	Good	Fair	Good	Good.
MdA, MdB----------- Meridian	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ne----------------- Newson	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
NlC2--------------- Norden	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
NlD2--------------- Norden	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
NuF*:										
Norden------------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urne--------------	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Dorerton----------	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Pa----------------- Palms	Good	Poor	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
Pd*. Pits										
Pm*. Psammaquents										
Ps*. Psamments										
RbA---------------- Reedsburg	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
RbB---------------- Reedsburg	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SfA---------------- Shiffer	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
TrB, TrC, TrD, TrE, TsA--------------- Tarr	Poor	Poor	Good	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
UfC2--------------- Urne	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
UfD2--------------- Urne	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
VaB---------------- Valton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
VaC2--------------- Valton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
VaD2--------------- Valton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
VwE*:										
Valton	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wildale	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Wa Wautoma	Fair	Fair	Good	Good	Good	Good	Good	Fair	Good	Good.
WdB Wildale	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WdC2 Wildale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WdD2 Wildale	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WeA Wyeville	Fair	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AbA: Abscota	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, droughty.
AtA, AtB: Atterberry	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
BeB: Bertrand	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
BeC2: Bertrand	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
BlA: Billett	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
BlB: Billett	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
BlC: Billett	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
BlD2: Billett	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BmA: Billett	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Moderate: frost action.	Slight.
BnA: Boaz	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action, low strength.	Moderate: wetness, flooding.
BoC: Boone	Severe: cutbanks cave.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
BoF: Boone	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
BpF*:						
Boone	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Rock outcrop.						
BrF: Brodale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, droughty, slope.
CeA: Ceresco	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Moderate: wetness, droughty, flooding.
CfA: Coffeen	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Moderate: wetness, flooding.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CnB--------------- Council	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
CnC--------------- Council	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
CnD, CnE---------- Council	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CuA--------------- Curran	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, frost action.	Moderate: wetness.
Dc---------------- Dawson	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding, low strength, frost action.	Severe: ponding, excess humus.
DdA--------------- Dells	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, frost action.	Moderate: wetness.
DlA--------------- Downs	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
DlB--------------- Downs	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
DlC2-------------- Downs	Moderate: wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
DlD2-------------- Downs	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
ElC--------------- Eleva	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
ElD, ElE---------- Eleva	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Et---------------- Ettrick	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
GaC--------------- Gale	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope, thin layer.
GaD--------------- Gale	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
HpA--------------- Hoopeston	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Hu----------------- Houghton	Severe: ponding, excess humus.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength, frost action.	Severe: excess humus, ponding.
ImA---------------- Impact	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty, too sandy.
ImB---------------- Impact	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: droughty, too sandy.
IpA---------------- Impact	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Moderate: droughty, too sandy.
JaA---------------- Jackson	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
JaB---------------- Jackson	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
Ka----------------- Kato	Severe: cutbanks cave, excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
KpA---------------- Kickapoo	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
LfC2--------------- La Farge	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope, thin layer.
LfD2--------------- La Farge	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
Lw----------------- Lows	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding.
Lx----------------- Loxley	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength, frost action.	Severe: too acid, ponding, excess humus.
MaA*:						
Meehan------------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty, too sandy.
Au Gres-----------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty, too sandy.
Mb----------------- Menasha	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MdA---------------- Meridian	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Moderate: frost action.	Slight.
MdB---------------- Meridian	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action.	Slight.
Ne----------------- Newton	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.
NlC2--------------- Norden	Severe: cutbanks cave.	Moderate: slope, shrink-swell.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope, thin layer.
NlD2--------------- Norden	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
NuF*:						
Norden------------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urne--------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Dorerton----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pa----------------- Palms	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength, frost action.	Severe: ponding, excess humus.
Pd*. Pits						
Pm*. Psammaquents						
Ps*. Psamments						
RbA, RbB----------- Reedsburg	Severe: wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
SfA---------------- Shiffer	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Moderate: wetness, flooding.
TrB---------------- Tarr	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight----------	Moderate: droughty, too sandy.
TrC---------------- Tarr	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
TrD, TrE----------- Tarr	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
TsA---------------- Tarr	Severe: cutbanks cave.	Slight----------	Moderate: wetness.	Slight----------	Slight----------	Moderate: droughty, too sandy.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
UfC2: Urne	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
UfD2: Urne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
VaB: Valton	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, frost action.	Slight.
VaC2: Valton	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, frost action.	Moderate: slope.
VaD2: Valton	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, frost action.	Severe: slope.
VwE*:						
Valton	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, frost action.	Severe: slope.
Wildale	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Wa: Wautoma	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
WdB: Wildale	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: small stones, large stones.
WdC2: Wildale	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: small stones, large stones, slope.
WdD2: Wildale	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
WeA: Wyeville	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AbA------------------ Abscota	Severe: flooding, wetness, poor filter.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too sandy, seepage.
AtA, AtB------------ Atterberry	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
BeB------------------ Bertrand	Slight-----------	Severe: seepage.	Severe: seepage.	Slight-----------	Fair: too clayey, thin layer.
BeC2----------------- Bertrand	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, slope, thin layer.
BlA, BlB------------ Billett	Severe**: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
BlC------------------ Billett	Severe**: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too sandy, slope.
BlD2----------------- Billett	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
BmA------------------ Billett	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy.
BnA------------------ Boaz	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
BoC------------------ Boone	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, seepage, too sandy.
BoF------------------ Boone	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, s*epage, slope.	Poor: area reclaim, segpag*< too sandy.
BpF*:					
Boone---------------	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, seepage, too sandy.
Rock outcrop.					
BrF------------------ Brodale	Severe: slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: small stones, slope.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CeA: Ceresco	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
CfA: Coffeen	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
CnB: Council	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
CnC: Council	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
CnD, CnE: Council	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
CuA: Curran	Severe: wetness.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
Dc: Dawson	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
DdA: Dells	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
DlA: Downs	Moderate: wetness.	Moderate: seepage, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
DlB: Downs	Moderate: wetness.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
DlC2: Downs	Moderate: wetness, slope.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: too clayey, slope.
DlD2: Downs	Severe: slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Poor: slope.
ElC: Eleva	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: area reclaim.
ElD, ElE: Eleva	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim.
Et: Ettrick	Severe: flooding, ponding, percs slowly.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: ponding, hard to pack.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GaC------------------ Gale	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
GaD------------------ Gale	Severe: depth to rock, slope, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
HpA------------------ Hoopeston	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Hu------------------- Houghton	Severe: ponding.	Severe: seepage, ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, seepage.	Poor: ponding, excess humus.
ImA, ImB------------- Impact	Severe**: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
IpA------------------ Impact	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
JaA, JaB------------- Jackson	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: too clayey, wetness.
Ka------------------- Kato	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, ponding.
KpA------------------ Kickapoo	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, too sandy.	Severe: flooding, wetness.	Poor: too sandy.
LfC2----------------- La Farge	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
LfD2----------------- La Farge	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Lw------------------- Lows	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, ponding.
Lx------------------- Loxley	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus, too acid.
MaA*:					
Meehan--------------	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MaA*:					
Au Gres	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Mb Menasha	Severe: flooding, ponding, percs slowly.	Slight	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
MdA, MdB Meridian	Severe**: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ne Newson	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
N1C2 Norden	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
N1D2 Norden	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
NuF*:					
Norden	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Urne	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
Dorerton	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
Pa Palms	Severe: subsides, ponding.	Severe: seepage, excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, seepage.	Poor: ponding, excess humus.
Pd*. Pits					
Pm*. Psammaquents					
Ps*. Psamments					
RbA Reedsburg	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, small stones.
RbB Reedsburg	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, small stones.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SfA: Shiffer	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
TrB: Tarr	Severe**: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
TrC: Tarr	Severe**: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
TrD, TrE: Tarr	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
TsA: Tarr	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
UfC2: Urne	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
UfD2: Urne	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
VaB: Valton	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
VaC2: Valton	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
VaD2: Valton	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
VwE*:					
Valton	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Wildale	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, small stones.
Wa: Wautoma	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: ponding, too clayey.	Severe: seepage, ponding.	Poor: too clayey, hard to pack, ponding.
WdB: Wildale	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack, small stones.

See footnotes at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
WdC2----------------- Wildale	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack, small stones.
WdD2----------------- Wildale	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, small stones.
WeA------------------ Wyeville	Severe: wetness, percs slowly.	Severe: seepage.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.
** The effluent drains satisfactorily but there is a danger of ground water pollution.

TABLE 13.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AbA: Abscota	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
AtA, AtB: Atterberry	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
BeB: Bertrand	Good	Probable	Improbable: too sandy.	Good.
BeC2: Bertrand	Good	Probable	Improbable: too sandy.	Fair: slope.
BlA, BlB: Billett	Good	Probable	Probable	Fair: small stones.
BlC: Billett	Good	Probable	Probable	Fair: small stones, slope.
BlD2: Billett	Fair: slope.	Probable	Probable	Poor: slope.
BmA: Billett	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, thin layer.
BnA: Boaz	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
BoC: Boone	Poor: area reclaim.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
BoF: Boone	Poor: area reclaim, slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
BpF*:				
Boone	Poor: area reclaim, slope.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
Rock outcrop.				
BrF: Brodale	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
CeA: Ceresco	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
CfA: Coffeen	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
CnB: Council	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
CnC: Council	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
CnD: Council	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CnE: Council	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
CuA: Curran	Fair: wetness.	Probable	Improbable: too sandy.	Good.
Dc: Dawson	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
DdA: Dells	Fair: wetness.	Probable	Improbable: too sandy.	Fair: thin layer.
DlA, DlB: Downs	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
DlC2: Downs	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
DlD2: Downs	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
ElC: Eleva	Poor: area reclaim.	Improbable: thin layer.	Improbable: excess fines.	Fair: slope, area reclaim, small stones.
ElD: Eleva	Poor: area reclaim.	Improbable: thin layer.	Improbable: excess fines.	Poor: slope.
ElE: Eleva	Poor: area reclaim, slope.	Improbable: thin layer.	Improbable: excess fines.	Poor: slope.
Et: Ettrick	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
GaC: Gale	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer, slope.
GaD: Gale	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
HpA: Hoopeston	Fair: wetness.	Probable	Improbable: too sandy.	Fair: small stones, thin layer.
Hu: Houghton	Poor: wetness, low strength.	Improbable: excess humus.	Improbable: excess humus.	Poor: wetness, excess humus.
ImA, ImB, IpA: Impact	Good	Probable	Improbable: too sandy.	Poor: too sandy.
JaA, JaB: Jackson	Fair: wetness.	Probable	Improbable: too sandy.	Good.
Ka: Kato	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
KpA: Kickapoo	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
LfC2------------------ La Farge	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer, slope.
LfD2------------------ La Farge	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Lw-------------------- Lows	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: wetness.
Lx-------------------- Loxley	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness, too acid.
MaA*:				
Meehan----------------	Fair: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy.
Au Gres---------------	Fair: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy.
Mb-------------------- Menasha	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, wetness.
MdA, MdB-------------- Meridian	Good-----------------	Probable-------------	Improbable: too sandy.	Fair: thin layer.
Ne-------------------- Newson	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: wetness.
NlC2------------------ Norden	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
NlD2------------------ Norden	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
NuF*:				
Norden----------------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Urne------------------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Dorerton--------------	Poor: slope.	Probable-------------	Probable-------------	Poor: small stones, area reclaim, slope.
Pa-------------------- Palms	Poor: wetness.	Improbable: excess humus, excess fines.	Improbable: excess humus, excess fines.	Poor: wetness, excess humus.
Pd*. Pits				
Pm*. Psammaquents				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ps*. Psamments				
RbA, RbB Reedsburg	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
SfA Shiffer	Fair: wetness.	Probable	Improbable: too sandy.	Fair: area reclaim, thin layer.
TrB, TrC Tarr	Good	Probable	Improbable: too sandy.	Poor: too sandy.
TrD Tarr	Fair: slope.	Probable	Improbable: too sandy.	Poor: slope, too sandy.
TrE Tarr	Poor: slope.	Probable	Improbable: too sandy.	Poor: slope, too sandy.
TsA Tarr	Good	Probable	Improbable: too sandy.	Poor: too sandy.
UfC2 Urne	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, slope.
UfD2 Urne	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
VaB Valton	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
VaC2 Valton	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, slope.
VaD2 Valton	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
VwE*:				
Valton	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Wildale	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Wa Wautoma	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
WdB, WdC2 Wildale	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
WdD2 Wildale	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WeA------------------- Wyeville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too sandy.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AbA: Abscota	Severe: seepage.	Severe: seepage, piping.	Flooding, cutbanks cave.	Fast intake, droughty, wetness.	Too sandy, soil blowing, wetness.	Droughty.
AtA: Atterberry	Moderate: seepage.	Severe: wetness.	Frost action	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
AtB: Atterberry	Moderate: seepage, slope.	Severe: wetness.	Frost action, slope.	Wetness, slope.	Erodes easily, wetness.	Wetness, erodes easily.
BeB: Bertrand	Moderate: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
BeC2: Bertrand	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
BlA: Billett	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Too sandy, soil blowing.	Favorable.
BlB: Billett	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Too sandy, soil blowing.	Favorable.
BlC, BlD2: Billett	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, too sandy, soil blowing.	Slope.
BmA: Billett	Severe: seepage.	Severe: seepage, piping.	Deep to water	Soil blowing	Too sandy, soil blowing.	Favorable.
BnA: Boaz	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, rooting depth, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily, rooting depth.
BoC, BoF: Boone	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
BpF*: Boone	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
Rock outcrop.						
BrF: Brodale	Severe: slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
CeA: Ceresco	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, frost action, cutbanks cave.	Wetness, droughty.	Wetness, soil blowing.	Wetness, droughty.
CfA: Coffeen	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, rooting depth, flooding.	Wetness	Wetness, rooting depth.
CnB: Council	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
CnC, CnD, CnE----- Council	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
CuA--------------- Curran	Moderate: seepage.	Severe: wetness.	Frost action---	Wetness--------	Erodes easily, wetness.	Wetness, erodes easily.
Dc---------------- Dawson	Severe: seepage.	Severe: excess humus, ponding.	Ponding, subsides, frost action.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
DdA--------------- Dells	Severe: seepage.	Severe: seepage, piping, wetness.	Frost action, cutbanks cave.	Wetness, erodes easily.	Erodes easily, wetness, too sandy.	Wetness, erodes easily.
DlA--------------- Downs	Moderate: seepage.	Slight---------	Deep to water	Favorable------	Erodes easily	Erodes easily.
DlB--------------- Downs	Moderate: seepage, slope.	Slight---------	Deep to water	Slope----------	Erodes easily	Erodes easily.
DlC2, DlD2-------- Downs	Severe: slope.	Slight---------	Deep to water	Slope----------	Slope, erodes easily.	Slope, erodes easily.
ElC, ElD, ElE----- Eleva	Severe: slope, seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Et---------------- Ettrick	Moderate: seepage.	Severe: ponding.	Flooding, frost action, ponding.	Flooding, ponding.	Ponding--------	Wetness.
GaC, GaD---------- Gale	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
HpA--------------- Hoopeston	Severe: seepage.	Severe: seepage, piping, wetness.	Frost action, cutbanks cave.	Wetness, soil blowing.	Wetness, too sandy, soil blowing.	Wetness.
Hu---------------- Houghton	Severe: seepage.	Severe: excess humus, ponding.	Frost action, subsides, ponding.	Soil blowing, ponding.	Ponding, soil blowing.	Wetness.
ImA, ImB, IpA----- Impact	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
JaA--------------- Jackson	Severe: seepage.	Moderate: thin layer, wetness.	Frost action---	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
JaB--------------- Jackson	Severe: seepage.	Moderate: thin layer, wetness.	Frost action, slope.	Wetness, slope, erodes easily.	Erodes easily, wetness.	Erodes easily.
Ka---------------- Kato	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, flooding, frost action.	Ponding, flooding.	Ponding, too sandy.	Wetness.
KpA--------------- Kickapoo	Moderate: seepage.	Moderate: wetness.	Deep to water	Soil blowing, flooding.	Too sandy, soil blowing.	Favorable.
LfC2, LfD2-------- La Farge	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, rooting depth, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Lw----------------- Lows	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, flooding, frost action.	Ponding, soil blowing.	Ponding, too sandy, soil blowing.	Wetness.
Lx----------------- Loxley	Severe: seepage.	Severe: excess humus, ponding.	Ponding, subsides, frost action.	Ponding, soil blowing, too acid.	Ponding, soil blowing.	Wetness.
MaA*:						
Meehan-----------	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty, wetness.
Au Gres----------	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Mb----------------- Menasha	Slight---------	Severe: hard to pack, ponding.	Ponding, percs slowly, flooding.	Ponding, droughty, percs slowly.	Ponding, percs slowly.	Wetness, droughty, rooting depth.
MdA---------------- Meridian	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable------	Too sandy------	Favorable.
MdB---------------- Meridian	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope----------	Too sandy------	Favorable.
Ne----------------- Newson	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
NlC2, NlD2--------- Norden	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
NuF*:						
Norden-----------	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Urne-------------	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Dorerton---------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, slope.	Slope, large stones.	Large stones, slope.
Pa----------------- Palms	Severe: seepage.	Severe: excess humus, ponding.	Ponding, subsides.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
Pd*. Pits						
Pm*. Psammaquents						
Ps*. Psamments						
RbA---------------- Reedsburg	Moderate: seepage.	Severe: hard to pack.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
RbB---------------- Reedsburg	Moderate: seepage, slope.	Severe: hard to pack.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness.	Wetness, erodes easily.
SfA---------------- Shiffer	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, frost action, cutbanks cave.	Wetness, rooting depth.	Wetness, too sandy.	Wetness, rooting depth.
TrB---------------- Tarr	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
TrC, TrD, TrE------ Tarr	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
TsA---------------- Tarr	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
UfC2, UfD2--------- Urne	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
VaB---------------- Valton	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
VaC2, VaD2--------- Valton	Severe: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
VwE*:						
Valton------------	Severe: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Wildale-----------	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Wa----------------- Wautoma	Severe: seepage.	Severe: ponding.	Ponding, percs slowly.	Ponding, droughty, fast intake.	Ponding, soil blowing, percs slowly.	Wetness, droughty, rooting depth.
WdB---------------- Wildale	Moderate: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
WdC2, WdD2--------- Wildale	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
WeA---------------- Wyeville	Severe: seepage.	Severe: wetness.	Percs slowly---	Wetness, droughty, fast intake.	Wetness, soil blowing, percs slowly.	Droughty, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
AbA---------------- Abscota	0-5	Loamy sand-------	SM	A-2-4	0	95-100	95-100	50-75	15-30	---	NP
	5-60	Sand, loamy fine sand, loamy sand.	SP, SM, SP-SM	A-2-4, A-1, A-3	0	95-100	95-100	45-65	0-15	---	NP
AtA, AtB---------- Atterberry	0-9	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	25-40	5-15
	9-44	Silty clay loam, silt loam.	CL, CH	A-7, A-6	0	100	100	95-100	95-100	35-55	20-30
	44-60	Silt loam, loam	CL	A-6	0	100	100	95-100	95-100	30-40	10-20
BeB, BeC2--------- Bertrand	0-10	Silt loam--------	ML	A-4	0	100	100	90-100	85-90	25-35	3-10
	10-42	Silt loam, silty clay loam.	CL	A-6, A-4	0	100	100	90-100	85-95	25-40	7-20
	42-50	Stratified silt loam to sand.	ML, SM, CL, SC	A-4	0	100	100	80-95	35-75	<25	2-10
	50-60	Sand, fine sand, loamy sand.	SP-SM, SM	A-2, A-3	0	95-100	95-100	50-80	5-35	---	NP
B1A, B1B, B1C, B1D2------------- Billett	0-9	Sandy loam-------	SM, SM-SC	A-2, A-4	0	100	95-100	85-100	25-50	12-23	NP-5
	9-22	Sandy loam, loam	SM, SC, SM-SC	A-2, A-4, A-6	0	100	95-100	85-100	25-50	<25	NP-15
	22-32	Sandy loam, gravelly sandy loam, loamy sand.	SM, SM-SC, SC	A-2, A-4	0-5	95-100	80-95	75-90	25-45	<25	NP-10
	32-60	Loamy sand, gravelly sand, sand.	GP-GM, GM, SM, SP-SM	A-1, A-2, A-3	0-5	25-100	20-100	20-75	5-30	<20	NP-5
BmA--------------- Billett	0-8	Sandy loam-------	SM, SC, ML, CL	A-4, A-2	0	100	95-100	60-85	30-55	<26	1-8
	8-30	Fine sandy loam, sandy loam.	SM, SC, ML, CL	A-4, A-2	0	95-100	85-100	60-85	30-55	<28	2-9
	30-36	Loamy fine sand, sandy loam.	SM	A-2, A-4	0	95-100	85-100	60-90	30-45	<21	NP-4
	36-60	Fine sand, sand	SM	A-2, A-4	0	95-100	85-100	60-90	15-40	---	NP
BnA--------------- Boaz	0-9	Silt loam--------	CL	A-4, A-6	0	100	100	90-100	70-90	25-30	7-11
	9-35	Silt loam, silty clay loam.	CL	A-4, A-6	0	100	100	90-100	85-95	25-40	9-20
	35-60	Silty clay loam, silt loam.	CL	A-4, A-6, A-7	0	100	100	90-100	70-95	25-45	7-23
BoC, BoF---------- Boone	0-2	Sand-------------	SM, SP-SM	A-2, A-3	0	75-100	75-100	40-80	5-35	---	NP
	2-22	Fine sand, coarse sand, sand.	SM, SP-SM	A-2, A-3, A-1	0	75-100	75-100	30-75	2-35	---	NP
	22-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
BpF*: Boone------------	0-2	Sand-------------	SM, SP-SM	A-2, A-3	0	75-100	75-100	40-80	5-35	---	NP
	2-22	Fine sand, coarse sand, sand.	SM, SP-SM	A-2, A-3, A-1	0	75-100	75-100	30-75	2-35	---	NP
	22-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
BrF--------------- Brodale	0-10	Flaggy very fine sandy loam.	SM, SP-SM, SC, GM	A-2, A-1	7-30	30-65	20-55	15-45	8-35	12-30	NP-8
	10-14	Very flaggy very fine sandy loam, flaggy silt loam, cobbly sandy loam.	SM, SC, GM, GC	A-2, A-4, A-1, A-6	20-50	30-65	20-55	15-45	12-45	10-35	NP-12
	14-42	Very flaggy very fine sandy loam, flaggy silt loam, cobbly sandy loam.	SM, SC, SM-SC, GM	A-2, A-1	20-50	45-80	40-75	25-50	10-35	12-30	NP-8
	42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CeA--------------- Ceresco	0-14	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-2, A-4	0	100	100	60-90	30-75	10-20	NP-6
	14-60	Fine sandy loam, loamy fine sand, silt loam.	SM, ML, CL, SC	A-2, A-4	0	95-100	80-100	60-95	15-80	15-30	NP-8
CfA--------------- Coffeen	0-13	Silt loam---------	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-100	25-40	5-20
	13-42	Silt loam---------	ML, CL-ML, CL	A-4	0	100	100	90-100	80-95	20-35	3-10
	42-60	Stratified silt loam to sandy loam.	ML, SM, SC, CL	A-4, A-2	0	100	90-100	85-100	30-85	15-30	NP-10
CnB, CnC, CnD, CnE-------------- Council	0-8	Silt loam---------	ML, SM	A-4	0	75-100	75-100	65-100	45-90	<20	NP-4
	8-52	Loam, silt loam	CL, CL-ML, SC, SM-SC	A-4	0	75-100	75-100	65-100	45-90	20-28	4-9
	52-60	Loam, silt loam	ML, CL, SM, SC	A-4	0	75-100	75-100	65-100	45-90	16-31	3-10
CuA--------------- Curran	0-13	Silt loam---------	CL	A-4, A-6	0	100	100	95-100	85-95	25-35	8-15
	13-50	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	90-100	85-95	28-50	9-25
	50-60	Sand, fine sand, loamy sand.	SM, SP-SM	A-2, A-3	0	95-100	95-100	50-90	5-35	---	NP
Dc---------------- Dawson	0-12	Fibric material	PT	A-8	---	---	---	---	---	---	---
	12-42	Sapric material	PT	A-8	---	---	---	---	---	---	---
	42-60	Sand--------------	SM-SC, SM, SC, SP-SM	A-2, A-3	0	95-100	90-100	50-75	5-30	<20	NP-10
DdA--------------- Dells	0-9	Silt loam---------	CL	A-4	0	100	100	95-100	90-95	25-30	7-10
	9-31	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	90-100	85-95	30-45	11-20
	31-33	Loam, sandy loam, sandy clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	100	100	60-100	40-75	20-35	4-14
	33-60	Sand, loamy sand	SP-SM, SM, SP	A-3, A-2, A-1	0	90-100	90-100	45-100	0-15	---	NP
DlA, DlB, DlC2, DlD2------------- Downs	0-9	Silt loam---------	CL, CL-ML	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	9-40	Silt loam, silty clay loam.	CL	A-7, A-6	0	100	100	100	95-100	35-45	15-25
	40-60	Silt loam---------	CL	A-6	0	100	100	100	95-100	30-40	11-20
ElC, ElD, ElE----- Eleva	0-2	Sandy loam--------	SM, SM-SC, ML, CL-ML	A-2, A-4	0	95-100	80-100	50-90	25-55	<25	2-7
	2-28	Loam, sandy loam, fine sandy loam.	ML, CL, SM, SC	A-2, A-4	0	95-100	80-100	50-95	25-75	20-28	4-9
	28-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Et---------------- Ettrick	0-10	Silt loam---------	CL	A-6, A-7	0	100	100	90-100	70-90	30-45	10-25
	10-35	Silt loam, silty clay loam.	CL, CH	A-7	0	100	100	90-100	85-100	40-55	15-30
	35-60	Stratified silt loam to fine sand.	CL, CL-ML, SC, SM-SC	A-2, A-4, A-6, A-7	0	100	100	60-100	30-100	20-45	4-25
GaC, GaD--------- Gale	0-7	Silt loam---------	CL-ML, CL	A-4, A-6	0	100	100	90-100	85-95	20-35	5-15
	7-29	Silt loam, silty clay loam.	CL	A-6, A-4, A-7	0	100	100	90-100	85-95	25-45	9-20
	29-33	Loam, sandy loam	CL, SC	A-4, A-6, A-2	0	100	100	65-100	40-95	20-40	9-20
	33-39	Loamy sand, sand	SM, SP-SM	A-3, A-2, A-1	0	85-100	85-100	45-75	5-30	---	NP
	39-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---
HpA---------------- Hoopeston	0-15	Sandy loam--------	SM	A-2, A-4	0	90-100	90-100	70-90	25-45	20-35	NP-10
	15-60	Loamy sand, sand	SP-SM, SM, SC, SM-SC	A-2, A-3	0	90-100	90-100	50-80	5-20	<25	NP-10
Hu---------------- Houghton	0-60	Sapric material	PT	A-8	0	---	---	---	---	---	---
ImA, ImB--------- Impact	0-15	Sand--------------	SM, SP-SM	A-2, A-3, A-1	0	95-100	75-100	45-80	5-25	---	NP
	15-36	Sand, loamy sand, loamy fine sand.	SM, SP-SM	A-1, A-2, A-3, A-4	0	95-100	75-100	45-90	5-40	---	NP
	36-60	Sand, fine sand	SP, SP-SM	A-1, A-2, A-3	0	95-100	75-100	45-80	1-10	---	NP
IpA---------------- Impact	0-17	Sand--------------	SM, SP-SM	A-2, A-3, A-1-B	0	95-100	75-100	45-80	5-25	---	NP
	17-37	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-1, A-2, A-3, A-4	0	95-100	75-100	45-90	5-40	---	NP
	37-60	Sand, fine sand	SP, SP-SM	A-3, A-2, A-1-B	0	95-100	75-100	45-80	1-10	---	NP
JaA, JaB--------- Jackson	0-9	Silt loam---------	CL	A-4, A-6	0	100	100	90-100	85-95	25-35	7-13
	9-41	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	85-95	30-50	15-25
	41-44	Stratified silt loam to sand.	SC, SM-SC, CL, CL-ML	A-4, A-6	0	100	100	85-100	35-75	20-30	4-11
	44-60	Sand, fine sand, loamy sand.	SP-SM, SM	A-2, A-3	0	95-100	95-100	50-90	5-35	---	NP
Ka---------------- Kato	0-14	Silt loam---------	CL, ML, OL	A-6, A-7, A-4	0	100	95-100	90-95	70-95	35-50	8-23
	14-36	Silty clay loam, silt loam.	ML, CL	A-6, A-7, A-4	0	100	95-100	90-95	70-95	35-50	8-23
	36-60	Sand, coarse sand, gravelly coarse sand.	SP, SW, SP-SM, SW-SM	A-1, A-3, A-2	0-5	75-100	70-95	25-70	2-12	<20	NP
KpA---------------- Kickapoo	0-5	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	100	100	70-85	40-55	<26	3-8
	5-60	Stratified silt to sand.	SC, SM-SC	A-4	0	100	100	65-75	35-45	<28	6-9
LfC2, LfD2-------- La Farge	0-8	Silt loam---------	CL, CL-ML	A-4	0	100	100	90-100	85-95	20-30	5-10
	8-25	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	85-95	25-40	10-25
	25-31	Fine sandy loam, loam, sandy clay loam.	CL, SC	A-6, A-4	0	95-100	95-100	70-90	40-65	20-35	7-20
	31-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Lw---------------- Lows	0-11	Sandy loam--------	SM, SM-SC	A-4, A-2	0	100	95-100	60-70	30-40	<20	2-7
	11-30	Loam, sandy loam, sandy clay loam.	CL, SC	A-6	0	100	95-100	80-95	35-75	20-35	10-20
	30-60	Loamy sand, sand	SM, SP, SP-SM	A-2, A-3	0	100	95-100	50-90	3-30	---	NP
Lx---------------- Loxley	0-14	Hemic material---	PT	A-8	---	---	---	---	---	---	---
	14-60	Sapric material	PT	A-8	---	---	---	---	---	---	---
MaA*: Meehan-----------	0-9	Sand--------------	SM, SP-SM	A-1, A-3, A-2	0	90-100	75-100	40-90	5-15	---	NP
	9-27	Sand, loamy sand, loamy coarse sand.	SM, SP-SM, SP	A-1, A-2, A-3	0	90-100	75-100	40-90	3-30	---	NP
	27-60	Sand, coarse sand	SP, SP-SM	A-1, A-3, A-2	0	90-100	75-100	40-90	0-5	---	NP
Au Gres----------	0-16	Sand--------------	SP, SM	A-2-4, A-3	0	95-100	90-100	50-70	0-15	---	NP
	16-26	Sand, loamy sand	SP-SM, SP, SM	A-2-4, A-3	0	95-100	90-100	60-80	0-15	---	NP
	26-60	Sand--------------	SP, SP-SM	A-3, A-2-4	0	95-100	90-100	50-90	0-10	---	NP
Mb---------------- Menasha	0-8	Silty clay loam	CL, CH	A-6, A-7	0	100	100	95-100	90-100	35-70	15-40
	8-29	Clay, silty clay	CH, CL	A-7	0	100	100	95-100	90-100	45-90	25-60
	29-60	Clay--------------	CH	A-7	0	100	100	95-100	90-100	61-90	35-60
MdA, MdB---------- Meridian	0-7	Loam--------------	ML, CL, CL-ML	A-4	0	100	100	85-95	60-75	19-30	2-10
	7-22	Loam, sandy clay loam.	CL, SC, SM-SC, CL-ML	A-4, A-6	0	100	100	80-95	35-75	20-35	4-15
	22-26	Sandy loam, loamy sand.	SM, SM-SC, SC	A-4, A-2	0	100	100	50-90	15-45	<26	NP-8
	26-60	Sand, loamy sand	SM, SP, SP-SM	A-2, A-3	0	100	100	50-90	0-30	---	NP
Nc---------------- Newson	0-6	Loamy sand--------	SM	A-2	0	90-100	90-100	45-85	12-35	---	NP
	6-25	Loamy sand, sand	SM, SP-SM, SP	A-2, A-3	0	80-100	75-100	45-75	3-30	---	NP
	25-60	Sand, loamy sand	SM, SP-SM, SP	A-2, A-3	0	80-100	75-100	45-75	3-30	---	NP
NlC2, NlD2-------- Norden	0-9	Silt loam---------	ML, CL, SM, SC	A-4, A-6	0	75-100	70-100	60-100	40-90	20-30	3-12
	9-40	Loam, clay loam, sandy clay loam.	CL, SC	A-6, A-2	0	75-100	70-100	55-100	25-85	25-40	10-25
	40-60	Unweathered bedrock, weathered bedrock.	---	---	---	---	---	---	---	---	---
NuF*: Norden-----------	0-10	Loam--------------	ML, CL, SM, SC	A-4, A-6	0	75-100	70-100	60-100	40-90	20-30	3-12
	10-29	Loam, clay loam, sandy clay loam.	CL, SC	A-6, A-2	0	75-100	70-100	55-100	25-85	25-40	10-25
	29-60	Unweathered bedrock, weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
NuF*: Urne	0-20	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-2, A-4	0	90-100	90-100	50-95	30-65	<26	2-7
	20-32	Very fine sandy loam, fine sandy loam, loamy fine sand.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	70-100	65-100	50-95	25-65	<25	NP-6
	32-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---
Dorerton	0-21	Silt loam	ML	A-4	0	100	100	70-95	55-90	20-30	NP-5
	21-56	Channery loam, channery clay loam, very channery loam.	GM, GC, SM, SC	A-2, A-1	20-55	40-75	30-65	20-45	12-35	30-45	5-20
	56-60	Very channery fine sandy loam, very channery loam, channery loamy sand.	GW-GM, SP-SM, SM	A-1, A-2	20-55	40-75	30-65	15-40	5-30	<20	NP
Pa Palms	0-34	Sapric material	PT	A-8	---	---	---	---	---	---	---
	34-60	Silt loam, silty clay loam, fine sandy loam.	CL-ML, CL	A-4, A-6	0	85-100	80-100	70-95	50-90	25-40	5-20
Pd*. Pits											
Pm*. Psammaquents											
Ps*. Psamments											
RbA, RbB Reedsburg	0-8	Silt loam	CL-ML	A-4	0	75-100	75-100	55-100	50-90	20-25	4-7
	8-27	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0-5	75-100	75-100	55-100	50-100	25-45	9-20
	27-60	Cherty clay, clay	CH, SC, GC	A-7	0-15	55-100	50-100	45-95	40-85	70-100	40-65
SfA Shiffer	0-9	Loam	CL, CL-ML	A-4, A-6	0	95-100	95-100	85-95	60-75	20-35	6-15
	9-21	Loam, sandy clay loam, clay loam.	CL, SC	A-6, A-4	0	95-100	95-100	80-95	35-75	25-35	9-15
	21-29	Sandy loam, loamy sand.	SM, SM-SC	A-2, A-4	0	95-100	95-100	50-75	15-40	17-27	1-7
	29-60	Sand, coarse sand, loamy sand.	SM, SP-SM, SP	A-2, A-3	0	95-100	95-100	50-95	3-30	---	NP
TrB, TrC, TrD, TrE Tarr	0-4	Sand	SM, SP-SM	A-1, A-2, A-3	0	90-100	90-100	45-80	5-35	---	NP
	4-32	Sand, fine sand	SP, SP-SM	A-1, A-3, A-2	0	90-100	90-100	45-80	1-10	---	NP
	32-60	Sand, fine sand	SP, SP-SM	A-1, A-3, A-2	0	90-100	90-100	45-80	1-10	---	NP
TsA Tarr	0-7	Sand	SM, SP-SM	A-1, A-2, A-3	0	90-100	90-100	45-80	5-35	---	NP
	7-38	Sand, fine sand	SP, SP-SM	A-1, A-3, A-2	0	90-100	90-100	45-80	1-10	---	NP
	38-60	Sand, fine sand	SP, SP-SM	A-1, A-3, A-2	0	90-100	90-100	45-80	1-10	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
UfC2, UfD2-------- Urne	0-20	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-2, A-4	0	90-100	90-100	65-95	30-65	<26	2-7
	20-32	Very fine sandy loam, fine sandy loam, loamy fine sand.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	70-100	65-100	50-95	25-65	<25	NP-6
	32-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---
VaB, VaC2, VaD2-- Valton	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0-25	75-100	75-100	70-100	55-100	20-40	4-17
	9-22	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0-25	75-100	75-100	70-100	55-100	25-45	9-22
	22-60	Clay, cherty clay, silty clay.	CH, CL, SC	A-7	0-25	50-95	50-95	45-95	40-90	45-85	25-55
VwE*: Valton-----------	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0-25	75-100	75-100	70-100	55-100	20-40	4-17
	9-22	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0-25	75-100	75-100	70-100	55-100	25-45	9-22
	22-60	Clay, cherty clay, silty clay.	CH, CL, SC	A-7	0-25	50-95	50-95	45-95	40-90	45-85	25-55
Wildale----------	0-9	Silt loam--------	CL, SC, GC	A-4, A-6	0-25	65-100	65-100	65-100	45-95	25-40	8-17
	9-15	Silty clay loam, cherty silty clay loam, silt loam.	CL, SC, GC	A-7, A-6	0-25	65-100	65-100	65-100	45-95	30-50	10-25
	15-60	Clay, cherty clay, silty clay.	CH, SC, GC, CL	A-7	0-25	65-100	50-100	45-100	40-95	45-85	25-55
Wa--------------- Wautoma	0-7	Sand-------------	SM, SP-SM	A-2, A-3	0	90-100	90-100	50-80	5-35	---	NP
	7-22	Sand, loamy sand, loamy fine sand.	SM, SP-SM	A-2, A-3, A-4	0	90-100	90-100	50-90	5-40	---	NP
	22-60	Silty clay, silty clay loam, clay.	CH, CL	A-7	0	100	100	90-100	85-95	40-55	25-35
WdB-------------- Wildale	0-9	Silt loam--------	CL, SC, GC	A-4, A-6	0-25	65-100	65-100	65-100	45-95	25-40	8-17
	9-15	Silty clay loam, cherty silty clay loam, silt loam.	CL, SC, GC	A-7, A-6	0-25	65-100	65-100	65-100	45-95	30-50	10-25
	15-60	Clay, cherty clay, silty clay.	CH, SC, GC, CL	A-7	0-25	65-100	50-100	45-100	40-95	45-85	25-55
WdC2, WdD2-------- Wildale	0-9	Cherty silt loam	CL, SC, GC	A-4, A-6	0-25	65-100	65-100	65-100	45-95	25-40	8-17
	9-15	Silty clay loam, cherty silty clay loam, silt loam.	CL, SC, GC	A-7, A-6	0-25	65-100	65-100	65-100	45-95	30-50	10-25
	15-60	Clay, cherty clay, silty clay.	CH, SC, GC, CL	A-7	0-25	65-100	50-100	45-100	40-95	45-85	25-55
WeA-------------- Wyeville	0-9	Loamy sand-------	SM	A-2, A-4	0	100	100	50-90	15-40	---	NP
	9-27	Sand, loamy sand, loamy fine sand.	SM, SP-SM	A-3, A-2, A-4	0	100	100	50-100	5-40	---	NP
	27-60	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	100	100	90-100	75-100	40-75	20-45

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH					Pct
AbA---------------Abscota	0-5	2-15	1.20-1.60	6.0-20	0.08-0.12	6.1-7.3	Low-----------	0.17	5	2	.5-3
	5-60	0-10	1.25-1.60	6.0-20	0.05-0.11	6.1-7.8	Low-----------	0.17			
AtA, AtB---------Atterberry	0-9	20-26	1.20-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.32	5	6	2-4
	9-44	25-35	1.30-1.50	0.6-2.0	0.18-0.20	5.1-6.0	Moderate------	0.43			
	44-60	18-27	1.35-1.55	0.6-2.0	0.20-0.22	5.6-7.3	Low-----------	0.43			
BeB, BeC2--------Bertrand	0-10	15-22	1.35-1.60	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	5	5	1-3
	10-42	18-30	1.55-1.65	0.6-2.0	0.18-0.22	5.1-6.5	Moderate------	0.37			
	42-50	10-20	1.55-1.65	0.6-6.0	0.09-0.22	5.1-6.5	Low-----------	0.37			
	50-60	1-4	1.55-1.65	6.0-20	0.05-0.07	5.1-6.5	Low-----------	0.15			
BlA, BlB, BlC, BlD2-------------Billett	0-9	8-12	1.40-1.70	2.0-6.0	0.13-0.17	5.1-6.0	Low-----------	0.20	5	3	1-2
	9-22	10-18	1.40-1.70	2.0-6.0	0.12-0.14	5.6-7.3	Low-----------	0.20			
	22-32	7-11	1.50-1.80	2.0-6.0	0.12-0.14	5.6-7.3	Low-----------	0.20			
	32-60	2-7	1.60-1.90	6.0-20	0.02-0.08	5.1-7.8	Low-----------	0.10			
BmA---------------Billett	0-8	5-15	1.40-1.75	2.0-6.0	0.13-0.18	6.1-7.8	Low-----------	0.24	4	3	1-2
	8-30	8-18	1.50-1.65	2.0-6.0	0.12-0.17	5.1-7.3	Low-----------	0.24			
	30-36	3-10	1.50-1.65	2.0-6.0	0.11-0.14	5.1-7.3	Low-----------	0.24			
	36-60	1-5	1.50-1.75	6.0-20	0.05-0.08	5.1-7.8	Low-----------	0.10			
BnA---------------Boaz	0-9	15-20	1.35-1.55	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	5	5	1-3
	9-35	18-32	1.55-1.65	0.6-2.0	0.18-0.22	5.6-7.3	Moderate------	0.37			
	35-60	18-35	1.65-1.75	0.6-2.0	0.18-0.22	5.6-7.3	Moderate------	0.37			
BoC, BoF---------Boone	0-2	2-3	1.55-1.65	6.0-20	0.07-0.10	5.1-6.5	Low-----------	0.15	4	1	<1
	2-22	0-3	1.55-1.70	6.0-20	0.04-0.11	5.1-6.5	Low-----------	0.15			
	22-60	---	---	---	---	---	--------------	----			
BpF*:											
Boone------------	0-2	2-3	1.55-1.65	6.0-20	0.07-0.10	5.1-6.5	Low-----------	0.15	4	1	<1
	2-22	0-3	1.55-1.70	6.0-20	0.04-0.11	5.1-6.5	Low-----------	0.15			
	22-60	---	---	---	---	---	--------------	----			
Rock outcrop.											
BrF---------------Brodale	0-10	5-18	1.15-1.30	0.6-2.0	0.06-0.12	6.6-8.4	Low-----------	0.20	2	8	2-5
	10-14	5-18	1.20-1.35	0.6-2.0	0.06-0.12	6.6-8.4	Low-----------	0.20			
	14-42	5-18	1.20-1.35	0.6-6.0	0.04-0.09	7.9-8.4	Low-----------	0.20			
	42	---	---	---	---	---	--------------	----			
CeA---------------Ceresco	0-14	2-15	1.15-1.60	2.0-6.0	0.13-0.22	6.1-7.8	Low-----------	0.20	5	3	3-5
	14-60	10-20	1.40-1.70	0.6-6.0	0.08-0.13	6.1-8.4	Low-----------	0.20			
CfA---------------Coffeen	0-13	15-30	1.20-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.32	5	6	2-3
	13-42	10-18	1.40-1.60	0.6-2.0	0.20-0.22	5.6-7.3	Low-----------	0.32			
	42-60	5-15	1.70-2.00	0.6-6.0	0.14-0.22	5.6-7.3	Low-----------	0.32			
CnB, CnC, CnD, CnE--------------Council	0-8	6-10	1.35-1.60	0.6-2.0	0.17-0.24	4.5-6.5	Low-----------	0.32	5	5	1-2
	8-52	10-18	1.55-1.65	0.6-2.0	0.14-0.22	4.5-6.5	Low-----------	0.32			
	52-60	8-18	1.55-1.65	0.6-2.0	0.14-0.22	5.1-7.3	Low-----------	0.32			
CuA---------------Curran	0-13	15-22	1.35-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.32	5	5	1-4
	13-50	18-30	1.45-1.65	0.6-2.0	0.18-0.22	5.1-6.5	Moderate------	0.43			
	50-60	1-4	1.55-1.65	6.0-20	0.05-0.10	5.1-6.5	Low-----------	0.15			
Dc----------------Dawson	0-12	---	0.30-0.40	>6.0	0.55-0.65	3.6-4.4	--------------	----	---	3	---
	12-42	---	0.19-0.29	2.0-6.0	0.35-0.45	3.6-4.4	--------------	----			
	42-60	0-5	1.56-1.74	6.0-20	0.03-0.10	4.5-6.0	Low-----------	----			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	G/cm^3	In/hr	In/in	pH					Pct
DdA-------------- Dells	0-9	14-18	1.35-1.55	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	4	5	1-3
	9-31	20-32	1.55-1.65	0.6-2.0	0.18-0.22	5.1-6.0	Moderate-----	0.37			
	31-33	10-25	1.55-1.65	0.6-2.0	0.12-0.19	5.1-6.0	Low----------	0.37			
	33-60	2-8	1.55-1.70	6.0-20	0.05-0.10	5.1-6.0	Low----------	0.15			
DlA, DlB, DlC2, DlD2------------ Downs	0-9	15-25	1.25-1.30	2.0-6.0	0.21-0.23	5.1-7.3	Low----------	0.32	5	6	2-3
	9-40	27-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.43			
	40-60	18-27	1.35-1.45	0.6-2.0	0.18-0.20	5.6-6.5	Moderate-----	0.43			
ElC, ElD, ElE---- Eleva	0-2	5-15	1.40-1.70	2.0-6.0	0.12-0.18	5.1-7.3	Low----------	0.24	4	3	1-3
	2-28	10-18	1.50-1.70	0.6-6.0	0.10-0.19	5.1-6.5	Low----------	0.24			
	28-60	---	---	---	---	---	-------------	----			
Et--------------- Ettrick	0-10	15-27	1.25-1.35	0.6-2.0	0.22-0.29	6.1-7.8	Low----------	0.28	5	6	4-12
	10-35	20-35	1.30-1.45	0.2-0.6	0.18-0.29	6.1-8.4	Moderate-----	0.28			
	35-60	8-27	1.40-1.60	0.6-6.0	0.20-0.25	6.1-8.4	Low----------	0.28			
GaC, GaD--------- Gale	0-7	12-20	1.35-1.45	0.6-2.0	0.21-0.24	4.5-7.3	Low----------	0.37	4	5	1-4
	7-29	20-32	1.45-1.55	0.6-2.0	0.17-0.22	4.5-6.5	Moderate-----	0.37			
	29-33	18-30	1.45-1.55	0.6-6.0	0.12-0.19	4.5-6.5	Low----------	0.37			
	33-39	1-10	1.30-1.50	6.0-20	0.06-0.11	5.1-6.5	Low----------	0.15			
	39-60	---	---	---	---	---	-------------	----			
HpA-------------- Hoopeston	0-15	8-18	1.35-1.70	2.0-6.0	0.12-0.15	5.1-6.5	Low----------	0.28	4	3	2-3
	15-60	2-10	1.50-1.80	6.0-20	0.05-0.10	5.6-7.8	Low----------	0.28			
Hu--------------- Houghton	0-60	---	0.15-0.45	2.0-6.0	0.35-0.45	5.6-7.8	-------------	----	---	3	>70
ImA, ImB--------- Impact	0-15	3-5	1.35-1.65	6.0-20	0.08-0.10	5.1-6.5	Low----------	0.15	5	1	.5-2
	15-36	<6	1.50-1.65	6.0-20	0.05-0.13	4.5-6.0	Low----------	0.15			
	36-60	<2	1.50-1.65	6.0-20	0.05-0.07	5.1-6.5	Low----------	0.15			
IpA-------------- Impact	0-17	3-5	1.35-1.65	6.0-20	0.08-0.10	4.5-6.0	Low----------	0.15	5	1	.5-2
	17-37	<6	1.50-1.65	6.0-20	0.05-0.13	4.5-6.0	Low----------	0.15			
	37-60	<2	1.50-1.65	6.0-20	0.05-0.07	5.1-6.5	Low----------	0.15			
JaA, JaB--------- Jackson	0-9	15-22	1.35-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5	1-3
	9-41	18-30	1.55-1.65	0.6-2.0	0.11-0.22	5.6-7.3	Moderate-----	0.37			
	41-44	10-20	1.55-1.65	0.6-2.0	0.06-0.22	5.1-6.5	Low----------	0.37			
	44-60	1-6	1.55-1.65	6.0-20	0.05-0.10	5.1-6.5	Low----------	0.15			
Ka--------------- Kato	0-14	24-35	1.25-1.40	0.6-2.0	0.18-0.24	6.1-7.8	Moderate-----	0.28	4	6	5-10
	14-36	24-35	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.3	Moderate-----	0.28			
	36-60	<5	1.55-1.65	6.0-20	0.02-0.07	6.1-7.8	Low----------	0.15			
KpA-------------- Kickapoo	0-5	8-16	1.20-1.55	0.6-2.0	0.16-0.18	5.1-7.8	Low----------	0.24	5	3	3-5
	5-60	12-18	1.50-1.60	0.6-2.0	0.12-0.16	5.1-7.8	Low----------	0.24			
LfC2, LfD2------- La Farge	0-8	14-17	1.35-1.55	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	4	5	1-3
	8-25	20-30	1.35-1.75	0.6-2.0	0.18-0.22	4.5-6.5	Moderate-----	0.37			
	25-31	6-30	1.55-1.70	0.6-2.0	0.15-0.19	4.5-6.5	Moderate-----	0.37			
	31-60	---	---	---	---	---	-------------	----			
Lw--------------- Lows	0-11	10-18	1.20-1.55	0.6-2.0	0.13-0.15	5.1-6.5	Low----------	0.28	4	3	3-5
	11-30	18-27	1.55-1.65	0.6-2.0	0.16-0.19	5.1-6.5	Moderate-----	0.28			
	30-60	2-8	1.60-1.90	6.0-20	0.05-0.11	5.1-6.5	Low----------	0.15			
Lx--------------- Loxley	0-14	---	0.30-0.40	2.0-6.0	0.45-0.55	<5.6	-------------	----	---	3	---
	14-60	---	0.10-0.35	2.0-6.0	0.35-0.45	<5.6	-------------	----			
MaA*: Meehan----------	0-9	1-4	1.35-1.65	6.0-20	0.07-0.09	5.1-7.3	Low----------	0.15	5	1	.5-3
	9-27	4-9	1.35-1.65	6.0-20	0.06-0.11	5.1-7.3	Low----------	0.17			
	27-60	1-4	1.50-1.65	6.0-20	0.02-0.07	5.1-7.3	Low----------	0.17			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cm^3	In/hr	In/in	pH					Pct
MaA*:											
Au Gres	0-16	0-8	0.65-1.55	6.0-20	0.07-0.10	4.5-7.3	Low	0.15	5	1	2-8
	16-26	1-15	1.20-1.55	6.0-20	0.06-0.09	4.5-7.3	Low	0.15			
	26-60	0-8	1.20-1.65	6.0-20	0.05-0.07	5.1-6.0	Low	0.15			
Mb Menasha	0-8	27-60	1.65-1.72	0.2-0.6	0.11-0.23	6.1-7.8	Moderate	0.32	3	4	1-3
	8-29	40-85	1.83-1.95	<0.2	0.09-0.13	6.1-8.4	High	0.32			
	29-60	60-85	1.80-1.95	<0.2	0.08-0.11	7.4-8.4	High	0.32			
MdA, MdB Meridian	0-7	8-20	1.35-1.55	0.6-2.0	0.20-0.22	6.1-7.8	Low	0.28	4	5	2-3
	7-22	18-22	1.55-1.65	0.6-2.0	0.16-0.19	5.1-6.5	Low	0.28			
	22-26	3-15	1.55-1.65	0.6-6.0	0.09-0.14	5.1-6.5	Low	0.28			
	26-60	1-6	1.55-1.70	6.0-20	0.05-0.10	5.1-6.5	Low	0.15			
Ne Newson	0-6	4-12	1.35-1.65	2.0-6.0	0.10-0.13	4.5-6.0	Low	0.17	5	2	4-15
	6-25	1-4	1.50-1.65	6.0-20	0.06-0.11	3.6-5.5	Low	0.17			
	25-60	1-4	1.50-1.65	6.0-20	0.05-0.10	4.5-6.5	Low	0.17			
NlC2, NlD2 Norden	0-9	7-18	1.35-1.50	0.6-2.0	0.20-0.24	5.1-7.3	Low	0.32	4	5	1-2
	9-40	18-30	1.45-1.55	0.6-2.0	0.15-0.20	5.1-7.3	Moderate	0.32			
	40-60	---	---	---	---	---	-------------	----			
NuF*:											
Norden	0-10	7-18	1.35-1.50	0.6-2.0	0.20-0.24	5.1-7.3	Low	0.32	4	5	1-2
	10-29	18-30	1.45-1.55	0.6-2.0	0.15-0.20	5.1-7.3	Moderate	0.32			
	29-60	---	---	---	---	---	-------------	----			
Urne	0-20	7-15	1.35-1.65	2.0-6.0	0.15-0.22	5.1-7.8	Low	0.28	4	3	.5-1
	20-32	3-12	1.55-1.65	2.0-6.0	0.12-0.19	5.1-7.8	Low	0.37			
	32-60	---	---	---	---	---	-------------	----			
Dorerton	0-21	10-18	1.30-1.40	0.6-2.0	0.20-0.24	5.1-7.3	Low	0.32	2	5	1-2
	21-56	20-35	1.20-1.45	0.6-2.0	0.08-0.14	5.6-7.3	Low	0.24			
	56-60	2-25	1.20-1.45	2.0-6.0	0.03-0.09	7.4-8.4	Low	0.10			
Pa Palms	0-34	---	0.25-0.45	2.0-6.0	0.35-0.45	5.1-7.8	-------------	----	2	3	>75
	34-60	7-35	1.45-1.75	0.2-0.6	0.14-0.22	6.1-8.4	Low	----			
Pd*. Pits											
Pm*. Psammaquents											
Ps*. Psamments											
RbA, RbB Reedsburg	0-8	10-14	1.25-1.35	0.6-2.0	0.20-0.24	5.6-7.3	Low	0.37	4	5	2-3
	8-27	18-30	1.40-1.50	0.6-2.0	0.16-0.22	4.5-6.5	Moderate	0.37			
	27-60	55-80	1.40-1.55	0.06-0.2	0.05-0.09	4.5-6.0	High	0.28			
SfA Shiffer	0-9	12-22	1.20-1.55	0.6-2.0	0.20-0.22	6.1-7.8	Low	0.28	4	5	2-4
	9-21	18-27	1.55-1.65	0.6-2.0	0.15-0.19	4.5-6.5	Moderate	0.28			
	21-29	6-15	1.55-1.65	0.6-6.0	0.09-0.19	4.5-6.5	Low	0.15			
	29-60	2-8	1.60-1.90	6.0-20	0.05-0.10	4.5-6.5	Low	0.15			
TrB, TrC, TrD, TrE Tarr	0-4	3-5	1.35-1.65	6.0-20	0.08-0.10	4.5-6.0	Low	0.15	5	1	.5-2
	4-32	3-8	1.50-1.65	6.0-20	0.05-0.07	4.5-6.0	Low	0.15			
	32-60	3-8	1.50-1.65	6.0-20	0.05-0.07	5.1-6.5	Low	0.15			
TsA Tarr	0-7	3-5	1.35-1.65	6.0-20	0.08-0.10	4.5-6.0	Low	0.15	5	1	.5-2
	7-38	<1	1.50-1.65	6.0-20	0.05-0.07	4.5-6.0	Low	0.15			
	38-60	<1	1.50-1.65	6.0-20	0.05-0.07	5.1-6.5	Low	0.15			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	G/cm^3	In/hr	In/in	pH					Pct
UfC2, UfD2-------- Urne	0-20	7-15	1.35-1.65	2.0-6.0	0.15-0.22	5.1-7.8	Low-----------	0.28	4	3	.5-1
	20-32	3-12	1.55-1.65	2.0-6.0	0.12-0.19	5.1-7.8	Low-----------	0.37			
	32-60	---	---	---	---	---	--------------	----			
VaB, VaC2, VaD2-- Valton	0-9	10-20	1.25-1.35	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.37	4	5	1-3
	9-22	18-35	1.40-1.55	0.6-2.0	0.18-0.22	5.1-7.3	Moderate-----	0.37			
	22-60	40-80	1.40-1.55	0.06-0.2	0.09-0.12	3.6-6.0	High----------	0.20			
VwE*:											
Valton-----------	0-9	10-20	1.25-1.35	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.37	4	5	1-3
	9-22	18-35	1.40-1.55	0.6-2.0	0.18-0.22	5.1-7.3	Moderate-----	0.37			
	22-60	40-80	1.40-1.55	0.06-0.2	0.09-0.12	3.6-6.0	High----------	0.20			
Wildale----------	0-9	15-20	1.35-1.45	0.6-2.0	0.14-0.24	5.6-7.3	Low-----------	0.37	3	5	2-3
	9-15	20-40	1.45-1.55	0.6-2.0	0.08-0.20	3.6-6.0	Moderate-----	0.37			
	15-60	40-80	1.25-1.45	0.06-0.2	0.04-0.11	3.6-6.0	High----------	0.28			
Wa---------------- Wautoma	0-7	2-8	1.35-1.65	2.0-6.0	0.07-0.09	5.1-6.5	Low-----------	0.15	4	1	4-8
	7-22	2-10	1.45-1.65	2.0-6.0	0.06-0.11	5.1-6.5	Low-----------	0.17			
	22-60	35-55	1.65-1.85	<0.2	0.08-0.20	5.1-7.3	Moderate-----	0.32			
WdB, WdC2, WdD2-- Wildale	0-9	15-20	1.35-1.45	0.6-2.0	0.14-0.24	5.6-7.3	Low-----------	0.37	3	5	2-3
	9-15	20-40	1.45-1.55	0.6-2.0	0.08-0.20	3.6-6.0	Moderate-----	0.37			
	15-60	40-80	1.25-1.45	0.06-0.2	0.04-0.11	3.6-6.0	High----------	0.28			
WeA--------------- Wyeville	0-9	4-10	1.55-1.70	2.0-6.0	0.10-0.12	5.6-7.3	Low-----------	0.17	5	2	<1
	9-27	2-10	1.55-1.70	2.0-6.0	0.06-0.11	5.1-7.3	Low-----------	0.17			
	27-60	35-55	1.65-1.85	<0.2	0.10-0.20	5.1-7.3	Moderate-----	0.32			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Total subsi-dence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness			Uncoated steel	Concrete
					Ft			In		In			
AbA: Abscota	A	Occasional	Brief	Mar-Jun	2.5-5.0	Apparent	Dec-May	>60	---	---	Low	Low	Low.
AtA, AtB: Atterberry	B	None	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	---	High	High	Moderate.
BeB, BeC2: Bertrand	B	None	---	---	>6.0	---	---	>60	---	---	High	Low	Moderate.
BlA, BlB, BlC, BlD2: Billett	A	None	---	---	>6.0	---	---	>60	---	---	Moderate	Low	Moderate.
BmA: Billett	B	None	---	---	3.0-6.0	Apparent	Nov-Apr	>60	---	---	Moderate	Low	Moderate.
BnA: Boaz	C	Occasional	Brief	Nov-May	1.0-2.5	Apparent	Nov-Jun	>60	---	---	High	High	Low.
BoC, BoF: Boone	A	None	---	---	>6.0	---	---	20-40	Soft	---	Low	Low	Moderate.
BpF*:													
Boone	A	None	---	---	>6.0	---	---	20-40	Soft	---	Low	Low	Moderate.
Rock outcrop.													
BrF: Brodale	C	None	---	---	>6.0	---	---	40-80	Hard	---	Low	Low	Low.
CeA: Ceresco	B	Occasional	Brief	Mar-May	1.0-2.0	Apparent	Sep-May	>60	---	---	High	Low	Low.
CfA: Coffeen	B	Occasional	Brief	Mar-May	1.0-3.0	Apparent	Jan-May	>60	---	---	High	High	Moderate.
CnB, CnC, CnD, CnE: Council	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	Low	Moderate.
CuA: Curran	C	Rare	---	---	1.0-3.0	Apparent	Sep-Apr	>60	---	---	High	High	High.
Dc: Dawson	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	30-36	High	High	High.
DdA: Dells	C	Rare	---	---	1.0-3.0	Apparent	Nov-May	>60	---	---	High	Low	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Total subsi-dence	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In		In			
DlA, DlB, DlC2, DlD2----------- Downs	B	None--------	---	---	3.0-6.0	Apparent	Mar-Jun	>60	---	---	High-----	Moderate	Moderate.
ElC, ElD, ElE--- Eleva	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low------	Moderate.
Et-------------- Ettrick	B/D	Frequent----	Brief to long.	Nov-May	+1-1.0	Apparent	Nov-Jun	>60	---	---	High-----	High-----	Low.
GaC, GaD-------- Gale	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	High-----	Moderate	Moderate.
HpA------------- Hoopeston	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	---	High-----	Low------	Moderate.
Hu-------------- Houghton	A/D	None--------	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	55-60	High-----	High-----	Low.
ImA, ImB-------- Impact	A	None--------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	High.
IpA------------- Impact	A	None--------	---	---	3.0-6.0	Apparent	Oct-Jun	>60	---	---	Low------	Low------	High.
JaA, JaB-------- Jackson	B	None--------	---	---	2.5-6.0	Apparent	Nov-Apr	>60	---	---	High-----	Moderate	Moderate.
Ka-------------- Kato	B/D	Frequent----	Brief-----	Nov-May	+1-1.0	Apparent	Jan-Dec	>60	---	---	High-----	High-----	Moderate.
KpA------------- Kickapoo	B	Occasional	Brief-----	Sep-Jun	3.0-6.0	Apparent	Nov-May	>60	---	---	Moderate	Moderate	Moderate.
LfC2, LfD2------ La Farge	B	None--------	---	---	>6.0	---	---	24-40	Soft	---	High-----	Moderate	Moderate.
Lw-------------- Lows	B/D	Occasional	Brief-----	Nov-May	+1-1.0	Apparent	Nov-May	>60	---	---	High-----	High-----	Moderate.
Lx-------------- Loxley	A/D	None--------	---	---	+1-1.0	Apparent	Nov-May	>60	---	50-55	High-----	High-----	High.
MaA*:													
Meehan----------	A	None--------	---	---	1.5-3.0	Apparent	Oct-May	>60	---	---	Moderate	Low------	Moderate.
Au Gres---------	B	None--------	---	---	1.0-2.0	Apparent	Nov-May	>60	---	---	Moderate	Low------	Moderate.
Mb-------------- Menasha	D	Occasional	Long------	Apr-May	+1-1.0	Perched	Oct-Jun	>60	---	---	High-----	High-----	Low.
MdA, MdB-------- Meridian	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Low------	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Total subsi-dence	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In		In			
Ne---------------- Newson	A/D	Occasional	Brief-----	Apr-Jun	0-1.0	Apparent	Nov-Jun	>60	---	---	Moderate	High-----	High.
NlC2, NlD2------- Norden	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low------	Moderate.
NuF*:													
Norden----------	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low------	Moderate.
Urne------------	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low------	Moderate.
Dorerton--------	B	None--------	---	---	>6.0	---	---	45-70	Soft	---	Low------	Low------	Moderate.
Pa---------------- Palms	A/D	None--------	---	---	+1-1.0	Apparent	Nov-May	>60	---	25-32	High-----	High-----	Moderate.
Pd*. Pits													
Pm*. Psammaquents													
Ps*. Psamments													
RbA, RbB--------- Reedsburg	C	None--------	---	---	1.0-3.0	Perched	Nov-May	>60	---	---	High-----	High-----	High.
SfA--------------- Shiffer	C	Occasional	Brief-----	Mar-May	1.0-3.0	Apparent	Nov-May	>60	---	---	High-----	High-----	Moderate.
TrB, TrC, TrD, TrE------------- Tarr	A	None--------	---	---	>6.0	---	---	>60	---	---	Low------	Low------	High.
TsA-------------- Tarr	A	None--------	---	---	3.0-6.0	Apparent	Oct-Jun	>60	---	---	Low------	Low------	High.
UfC2, UfD2------- Urne	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low------	Moderate.
VaB, VaC2, VaD2- Valton	C	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Moderate	High.
VwE*:													
Valton----------	C	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Moderate	High.
Wildale---------	C	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate	High.
Wa---------------- Wautoma	B/D	None--------	---	---	+1-1.0	Apparent	Nov-May	>60	---	---	Moderate	Moderate	Moderate.
WdB, WdC2, WdD2- Wildale	C	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Total subsi-dence	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness			Uncoated steel	Concrete
					Ft			In		In			
WeA: Wyeville	C	None	---	---	1.0-3.0	Apparent	Nov-Apr	>60	---	---	Moderate	Moderate	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--ENGINEERING INDEX TEST DATA

[Tests performed by the Wisconsin Department of Transportation, Division of Highways and Transportation Facilities, in cooperation with the U.S. Department of Transportation, Federal Highway Administration, in accordance with standard procedures of the American Association of State Highway and Transportation Officials (AASHTO) (1). Absence of an entry indicates that no determination was made]

Soil name and location	Parent material	Report number	Depth	Moisture density: Maximum dry density	Moisture density: Optimum moisture	Grain-size distribution*, Percentage passing sieve--: No. 4	No. 10	No. 40	No. 200	Grain-size distribution*, Percentage smaller than--: 0.05 mm	0.02 mm	0.005 mm	0.002 mm	Liquid limit	Plasticity index	Classification: AASHTO	Classification: Unified
			In	Lb/ft^3	Pct									Pct			
Atterberry silt loam: SW1/4SW1/4 sec. 13, T. 16 N., R. 2 W.	Loess----------	S75WI-081-14-1	15-25	--	--	--	100	99	97	95	64	35	28	42	21	A-7-6 (13)	CL
		S75WI-081-14-2	40-60	--	--	--	100	99	97	95	58	25	19	35	11	A-6(8)	CL
Bertrand silt loam: NW1/4SE1/4 sec. 18, T. 17 N., R. 4 W.	Loess and other silty deposits over fine sand.	S79WI-081-1-1	15-28	--	--	--	100	97	84	77	49	22	17	34	12	A-6(9)	CL
		S79WI-081-1-2	48-60	--	--	--	100	98	15	12	8	4	3	--	NP**	A-2-4 (0)	SM
Billett sandy loam: NE1/4SW1/4 sec. 22, T. 19 N., R. 3 W.	Loamy deposits over sandy deposits.	S75WI-081-7-1	13-28	--	--	--	100	96	37	36	29	14	8	--	NP	A-4(0)	SM
		S75WI-081-7-2	32-60	116.0	9.9	--	100	94	11	10	7	4	3	--	NP	A-2-4 (0)	SP-SM
Boaz silt loam: NE1/4NE1/4 sec. 21, T. 16 N., R. 2 W.	Silty alluvium	S79WI-081 6-1	16-35	--	--	--	100	98	87	81	52	26	21	39	19	A-6 (12)	CL
		S79WI-081-6-2	35-66	--	--	--	100	99	93	89	65	31	24	43	22	A-7-6 (14)	CL
Ceresco fine sandy loam: SW1/4SW1/4 sec. 4, T. 15 N., R. 4 W.	Loamy and sandy alluvium.	S79WI-081-4-1	31-42	--	--	--	100	95	52	44	25	11	8	21	NP	A-4(3)	ML
		S79WI-081-4-2	42-55	--	--	99	98	87	32	28	20	11	9	17	NP	A-2-4 (0)	SM
Council silt loam: SE1/4NW1/4 sec. 15, T. 19 N., R. 3 W.	Loamy and silty deposits.	S77WI-081-4-1	11-29	--	--	--	100	96	51	48	33	14	10	--	NP	A-4(3)	ML
		S77WI-081-4-2	35-60	120.6	11.2	--	100	98	49	45	27	13	11	16	NP	A-4(3)	SM-SC

See footnotes at end of table.

TABLE 18.--ENGINEERING INDEX TEST DATA--Continued

Soil name and location	Parent material	Report number	Depth	Moisture density: Maximum dry density	Moisture density: Optimum moisture	Grain-size distribution*: Percentage passing sieve--: No. 4	No. 10	No. 40	No. 200	Percentage smaller than--: 0.05 mm	0.02 mm	0.005 mm	0.002 mm	Liquid limit	Plasticity index	Classification: AASHTO	Unified
			In	Lb/ft3	Pct									Pct			
Dells silt loam: NW1/4NW1/4 sec. 4, T. 17 N., R. 3 W.	Loess or other silty deposits over loamy deposits and sand.	S74WI-081-8-1	11-20	--	--	--	100	97	77	74	59	35	28	43	20	A-7-6 (13)	CL
		S74WI-081-8-2	31-60	--	--	--	100	99	2	2	2	2	1	--	NP	A-3(0)	SP
Downs silt loam: NW1/4NE1/4 sec. 29, T. 16 N., R. 2 W.	Loess or other silty deposits.	S75WI-081-8-1	19-30	--	--	--	100	100	99	95	64	32	26	41	18	A-7-6 (12)	CL
		S75WI-081-8-2	43-60	--	--	--	100	100	93	90	61	24	18	31	11	A-6(8)	CL
Downs silt loam: SE1/4NE1/4 sec. 15, T. 15 N., R. 3 W.	Loess or other silty deposits.	S75WI-081-15-1	17-29	--	--	--	--	100	99	96	64	30	24	34	11	A-6(8)	CL
		S75WI-081-15-2	36-60	--	--	--	--	100	98	95	60	28	22	35	13	A-6(9)	CL
Eleva sandy loam: SE1/4NW1/4 sec. 16, T. 18 N., R. 2 W.	Loamy residuum of sandstone.	S74WI-41-5-1	6-18	--	--	--	100	90	58	53	33	14	9	--	NP	A-4(5)	ML
		S74WI-41-5-2	24-30	--	--	--	100	23	28	25	18	11	9	--	NP	A-2-4 (0)	SM
Ettrick silt loam: SW1/4NW1/4 sec. 27, T. 16 N., R. 4 W.	Silty alluvium	S60WI-081-1-1	12-18	102	21	--	--	--	94	94	84	44	35	55	32	A-7-6 (19)	CH
		S60WI-081-1-2	26-42	113	16	--	--	--	100	97	75	32	26	41	20	A-7-6 (12)	CL
Ettrick silt loam: NW1/4SW1/4 sec. 10, T. 15 N., R. 2 W.	Silty alluvium	S60WI-081-2-1	13-20	--	--	--	--	100	98	97	61	26	21	41	16	A-7-6 (10)	CL
		S60WI-081-2-2	20-60	--	--	--	--	100	98	96	66	29	24	34	14	A-6(10)	CL
Ettrick silt loam: SW1/4SE1/4 sec. 33, T. 15 N., R. 2 W.	Silty alluvium	S76WI-081-7-1	14-28	--	--	--	100	98	94	91	69	30	24	37	16	A-6(11)	CL
		S76WI-081-7-2	32-60	--	--	--	--	100	98	95	73	34	27	40	19	A-6(12)	CL

See footnotes at end of table.

TABLE 18.--ENGINEERING INDEX TEST DATA--Continued

Soil name and location	Parent material	Report number	Depth	Moisture density: Maximum dry density	Moisture density: Optimum moisture	Grain-size distribution*: Percentage passing sieve--: No. 4	No. 10	No. 40	No. 200	Percentage smaller than--: 0.05 mm	0.02 mm	0.005 mm	0.002 mm	Liquid limit	Plasticity index	Classification: AASHTO	Unified
			In	Lb/ft3	Pct									Pct			
Hoopeston sandy loam***: NW1/4NW1/4 sec. 9, T. 17 N., R. 1 W.	Loamy deposits over sandy deposits.	S78WI-081-3-1	10-15	--	--	--	100	95	33	33	24	10	6	12	NP	A-2-4 (0)	SM
		S78WI-081-3-2	24-60	--	--	--	100	97	5	5	4	3	2	--	NP	A-3(0)	SP-SM
Kickapoo fine sandy loam: SW1/4NW1/4 sec. 35, T. 15 N., R. 2 W.	Loamy alluvium	S76WI-081-8-1	16-36	--	--	--	--	100	87	82	54	17	10	33	7	A-4(8)	ML
		S76WI-081-8-2	36-60	99.6	20.7	--	--	100	89	85	62	20	11	36	9	A-4(8)	ML
Kickapoo fine sandy loam: NW1/4NW1/4 sec. 33, T. 15 N., R. 4 W.	Loamy alluvium	S79WI-081-2-1	5-10	--	--	--	100	98	43	39	18	6	3	24	NP	A-4(2)	SM
		S79WI-081-2-2	28-60	111.0	14.1	--	100	98	39	35	18	6	3	24	NP	A-4(1)	SM
Meehan sand***: SW1/4NE1/4 sec. 14, T. 19 N., R. 3 W.	Sandy deposits	S77WI-081-5-1	11-24	--	--	--	100	96	7	7	6	3	2	--	NP	A-3(0)	SM-SP
		S77WI-081-5-2	32-60	--	--	--	100	96	2	1	1	1	1	--	NP	A-3(0)	SP
Meridian loam: SE1/4SW1/4 sec. 23, T. 19 N., R. 4 W.	Loamy deposits over sandy deposits.	S79WI-081-2-1	13-22	--	--	--	100	95	53	49	39	21	16	24	9	A-4(4)	CL
		S79WI-081-2-2	26-60	115.7	11.0	--	100	88	10	8	6	3	3	14	NP	A-3(0)	SM
Reedsburg silt loam: NW1/4NE1/4 sec. 24, T. 16 N., R. 3 W.	Loess over cherty clay residuum of limestone.	S77WI-081-6-1	21-27	--	--	--	100	99	97	92	58	28	23	38	16	A-6(10)	CL
		S77WI-081-6-2	39-60	--	--	96	95	93	84	83	68	51	48	58	36	A-7-6 (20)	CH
Shiffer loam: SW1/4SE1/4 sec. 7, T. 17 N., R. 4 W.	Loamy deposits over sandy deposits.	S79WI-081-3-1	14-21	--	--	--	100	90	58	55	40	20	15	26	7	A-4(5)	CL-ML
		S79WI-081-3-2	29-60	--	--	--	100	83	14	13	8	5	4	--	NP	A-4(8)	SM

See footnotes at end of table.

TABLE 18.--ENGINEERING INDEX TEST DATA--Continued

Soil name and location	Parent material	Report number	Depth	Moisture density: Maximum dry density	Moisture density: Optimum moisture	Grain-size distribution* Percentage passing sieve--: No. 4	No. 10	No. 40	No. 200	Percentage smaller than--: 0.05 mm	0.02 mm	0.005 mm	0.002 mm	Liquid limit	Plasticity index	Classification: AASHTO	Classification: Unified
			In	Lb/ft^3	Pct									Pct			
Tarr sand: NE1/4NE1/4 sec. 28, T. 19 N., R. 3 W.	Sandy deposits weathered from sandstone.	S77WI-081-3-1	5-26	--	--	--	100	91	6	6	5	3	2	--	NP	A-3(0)	SP-SM
		S77WI-081-3-2	26-60	--	--	--	100	91	3	3	3	2	2	--	NP	A-3(0)	SP
Urne fine sandy loam: NE1/4NE1/4 sec. 28, T. 19 N., R. 3 W.	Loamy residuum of fine grained glauconitic sandstone.	S74WI-081-9-1	5-14	--	--	70	66	66	27	21	16	10	6	--	NP	A-2-4 (0)	SM
		S74WI-081-9-2	22-40	115.2	11.9	84	79	78	33	26	20	14	7	--	NP	A-2-4 (0)	SM
Valton silt loam: SW1/4NE1/4 sec. 24, T. 16 N., R. 3 W.	Loess over clayey residuum of limestone.	S75WI-081-6-1	13-23	--	--	93	91	88	82	79	57	28	23	35	16	A-6(10)	CL
		S75WI-081-6-2	41-60	--	--	83	80	71	52	51	44	35	33	44	26	A-7-6 (10)	CL
Wautoma sand: NW1/4SE1/4 sec. 15, T. 18 N., R. 1 E.	Sandy deposits over clayey lacustrine deposits.	S78WI-081-2-1	14-22	--	--	--	100	80	22	19	12	6	4	11	NP	A-2-4 (0)	SM
		S78WI-081-2-2	45-60	--	--	--	100	99	94	94	81	57	45	49	23	A-7-6 (15)	CL-ML
Wildale silt loam: SW1/4SW1/4 sec. 31, T. 16 N., R. 1 E.	Thin loess over clayey residuum of limestone.	S74WI-081-3-1	12-39	--	--	76	52	48	43	43	42	40	39	88	58	A-7-5 (8)	GC
		S74WI-081-3-2	39-60	--	--	68	60	56	49	49	48	43	41	74	42	A-7-5 (13)	GC
		S74WI-41-6-1	12-39	--	--	76	52	48	43	43	42	40	39	82	58	A-7-5 (8)	GC
		S74WI-41-6-2	39-60	--	--	68	60	56	49	49	48	43	41	74	42	A-7-5 (13)	GC

See footnotes at end of table.

TABLE 18.--ENGINEERING INDEX TEST DATA--Continued

Soil name and location	Parent material	Report number	Depth	Moisture density: Maximum dry density	Moisture density: Optimum moisture	Grain-size distribution*: Percentage passing sieve--: No. 4	No. 10	No. 40	No. 200	Percentage smaller than--: 0.05 mm	0.02 mm	0.005 mm	0.002 mm	Liquid limit	Plasticity index	Classification: AASHTO	Unified
			In	Lb/ft3	Pct									Pct			
Wyeville loamy sand: NE1/4SE1/4 sec. 36, T. 18 N., R. 1 E.	Sandy deposits over clayey lacustrine deposits.	S78WI-081-1-1	13-27	--	--	--	100	99	15	14	11	5	3	15	NP	A-2-4 (0)	SM
		S78WI-081-1-2	46-60	--	--	--	--	100	97	96	86	58	42	43	23	A-7-6 (14)	CL
Wyeville loamy sand: NE corner sec. 9, T. 18 N., R. 1 E.	Sandy deposits over clayey lacustrine deposits.	S62WI-081-1-1	8-11	127	8	--	100	86	18	16	12	8	6	--	NP	A-2-4 (0)	SM
		S62WI-081-1-2	39-60	104	20	--	100	99	94	91	76	55	42	43	20	A-7-6 (13)	CL

* Mechanical analysis according to the AASHTO Designation T88-57 (1). Results from this procedure can differ somewhat from the results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by hydrometer method and the various grain-size fractions are calculated on the basis of all material up to and including that 3 inches in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from the calculation of grain-size fraction. The mechanical analysis data used in this table are not suitable for use in naming textural classes of soils.

** NP means nonplastic.

*** These soils are taxadjuncts. See the series description for explanation.

TABLE 19.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Abscota	Mixed, mesic Typic Udipsamments
Atterberry	Fine-silty, mixed, mesic Udollic Ochraqualfs
*Au Gres	Sandy, mixed, frigid Entic Haplaquods
Bertrand	Fine-silty, mixed, mesic Typic Hapludalfs
Billett	Coarse-loamy, mixed, mesic Mollic Hapludalfs
Boaz	Fine-silty, mixed, nonacid, mesic Aeric Haplaquepts
Boone	Mesic, uncoated Typic Quartzipsamments
Brodale	Loamy-skeletal, carbonatic, mesic Entic Hapludolls
Ceresco	Coarse-loamy, mixed, mesic Fluvaquentic Hapludolls
Coffeen	Coarse-silty, mixed, mesic Fluvaquentic Hapludolls
Council	Coarse-loamy, mixed, mesic Typic Hapludalfs
Curran	Fine-silty, mixed, mesic Udollic Ochraqualfs
Dawson	Sandy or sandy-skeletal, mixed, dysic Terric Borosaprists
Dells	Fine-silty over sandy or sandy-skeletal, mixed, mesic Aquollic Hapludalfs
Dorerton	Loamy-skeletal, mixed, mesic Typic Hapludalfs
Downs	Fine-silty, mixed, mesic Mollic Hapludalfs
Eleva	Coarse-loamy, mixed, mesic Typic Hapludalfs
Ettrick	Fine-silty, mixed, mesic Fluvaquentic Haplaquolls
Gale	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
*Hoopeston	Coarse-loamy, mixed, mesic Aquic Hapludolls
Houghton	Euic, mesic Typic Medisaprists
Impact	Sandy, siliceous, mesic Quartzipsammentic Haplumbrepts
*Jackson	Fine-silty, mixed, mesic Typic Hapludalfs
Kato	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Haplaquolls
Kickapoo	Coarse-loamy, mixed, nonacid, mesic Typic Udifluvents
La Farge	Fine-silty, mixed, mesic Typic Hapludalfs
Lows	Fine-loamy over sandy or sandy-skeletal, mixed, nonacid, frigid Mollic Haplaquepts
Loxley	Dysic Typic Borosaprists
*Meehan	Mixed, frigid Aquic Udipsamments
Menasha	Very-fine, mixed, mesic Typic Haplaquolls
Meridian	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Mollic Hapludalfs
*Newson	Mixed, frigid Humaqueptic Psammaquents
Norden	Fine-loamy, mixed, mesic Typic Hapludalfs
Palms	Loamy, mixed, euic, mesic Terric Medisaprists
Psammaquents	Siliceous, mesic Typic Psammaquents
Psamments	Mixed, mesic Udipsamments
Reedsburg	Fine-silty, mixed, mesic Aquic Paleudalfs
Shiffer	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aquollic Hapludalfs
Tarr	Mesic, uncoated Typic Quartzipsamments
Urne	Coarse-loamy, mixed, mesic Dystric Eutrochrepts
Valton	Fine-silty, mixed, mesic Mollic Paleudalfs
Wautoma	Sandy over clayey, mixed, nonacid, mesic Mollic Haplaquents
Wildale	Fine, mixed, mesic Mollic Paleudalfs
Wyeville	Clayey, mixed, mesic Aquic Arenic Hapludalfs

* The soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

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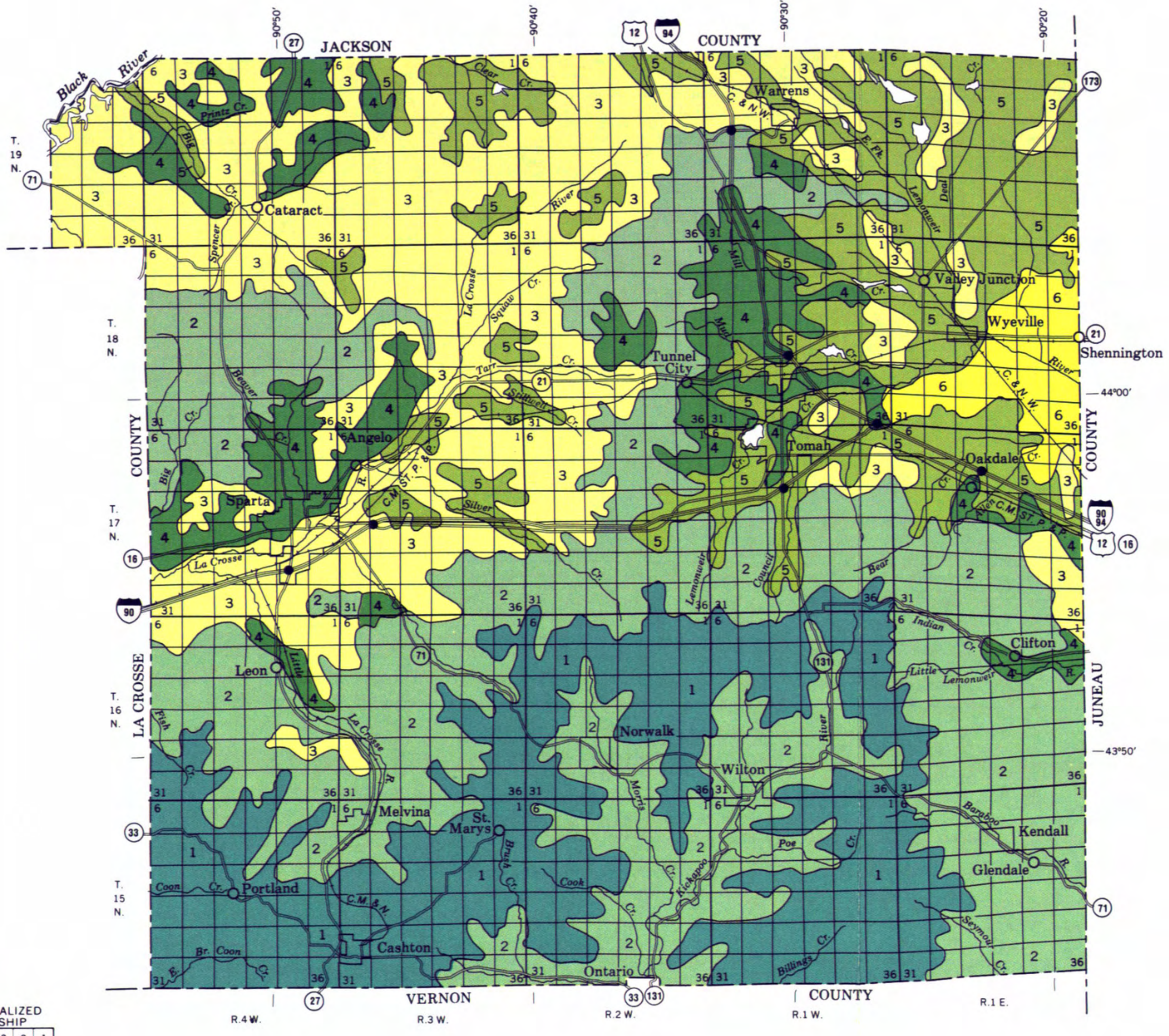


SOIL LEGEND *

1	VALTON-DOWNS-WILDALE: Nearly level to very steep, well drained and moderately well drained silty soils; on uplands and high stream terraces
2	NORDEN-URNE-LA FARGE: Gently sloping to very steep, well drained and somewhat excessively drained silty and loamy soils; on uplands
3	TARR-BOONE-IMPACT: Nearly level to very steep, excessively drained and moderately well drained sandy soils; on stream terraces and uplands
4	BILLETT-IMPACT: Nearly level to moderately steep, excessively drained to moderately well drained loamy and sandy soils; on stream terraces and uplands
5	NEWSON-DAWSON-MEEHAN: Nearly level and gently sloping, very poorly drained to somewhat poorly drained peaty and sandy soils; on flood plains, lake basins, and stream terraces
6	WYEVILLE-WAUTOMA-NEWSON: Nearly level and gently sloping, somewhat poorly drained and poorly drained sandy soils; on lake basins and stream terraces

* Texture terms refer to the surface layer of the major soils.

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

Compiled 1983

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
RESEARCH DIVISION OF THE COLLEGE OF AGRICULTURAL
AND LIFE SCIENCES, UNIVERSITY OF WISCONSIN

GENERAL SOIL MAP

MONROE COUNTY, WISCONSIN

Scale 1:253,440

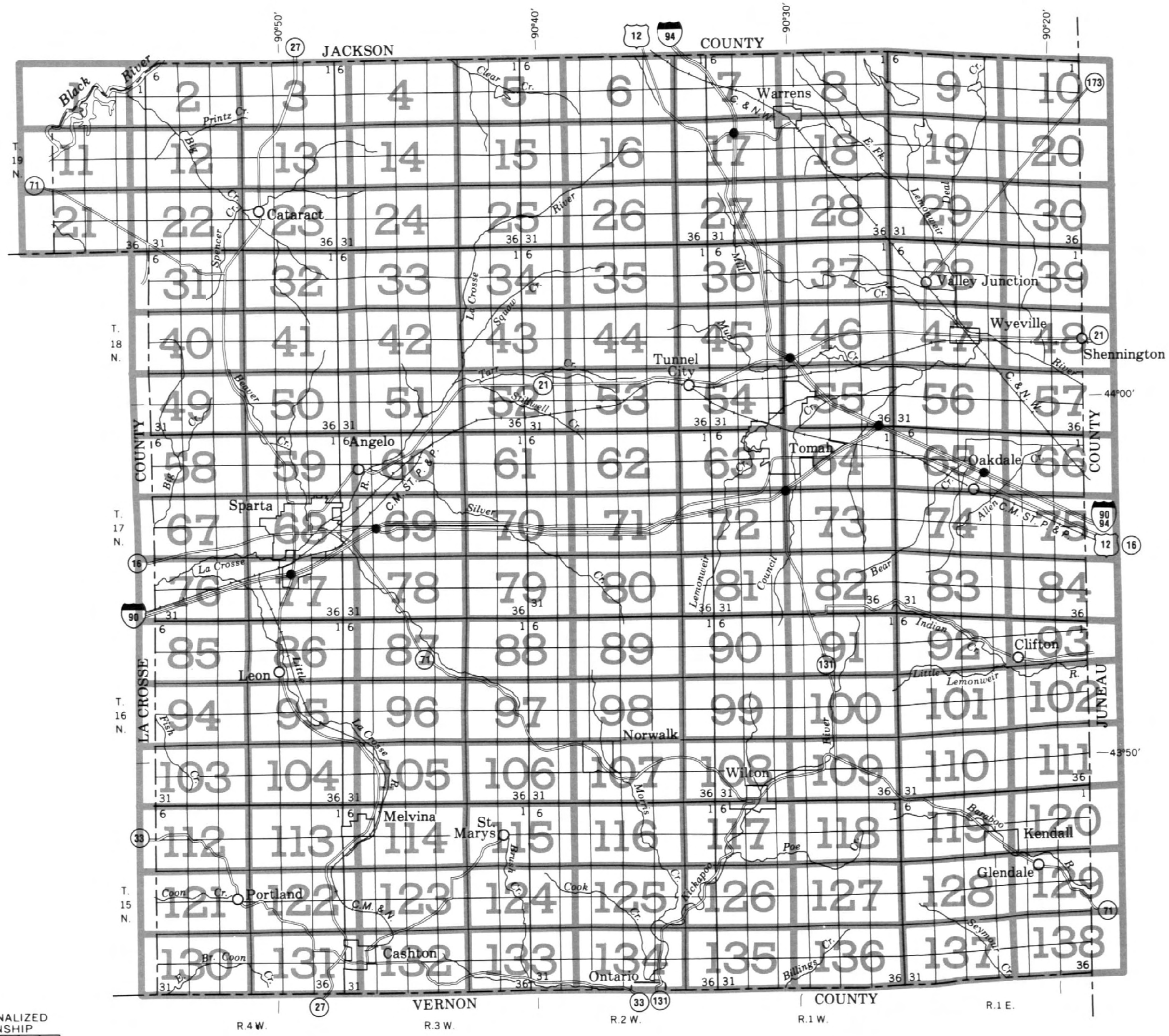
1 0 1 2 3 4 Miles

1 0 4 8 Km

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Original text from each individual map sheet read:
This map is compiled on 1976 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



N

INDEX TO MAP SHEETS
MONROE COUNTY, WISCONSIN

Scale 1:253,440

1 0 1 2 3 4 Miles

1 0 4 8 Km

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

SOIL LEGEND

Map symbols consist of a combination of letters or of letters and numbers. The first capital letter is the initial one of the soil name. The lowercase letter that follows separates map units having names that begin with the same letter, except that it does not separate sloping or eroded phases. The second capital letter indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A final number of 2 indicates that the soil is eroded.

SYMBOL	NAME
AbA	Abscota loamy sand, 0 to 3 percent slopes
AtA	Atterberry silt loam, 0 to 2 percent slopes
AtB	Atterberry silt loam, 2 to 6 percent slopes
BeB	Bertrand silt loam, 2 to 6 percent slopes
BeC2	Bertrand silt loam, 6 to 12 percent slopes, eroded
BlA	Billett sandy loam, 0 to 2 percent slopes
BlB	Billett sandy loam, 2 to 6 percent slopes
BlC	Billett sandy loam, 6 to 12 percent slopes
BlD2	Billett sandy loam, 12 to 20 percent slopes, eroded
BmA	Billett sandy loam, moderately well drained, 0 to 3 percent slopes
BnA	Boaz silt loam, 0 to 3 percent slopes
BoC	Boone sand, 6 to 12 percent slopes
BoF	Boone sand, 12 to 45 percent slopes
BpF	Boone-Rock outcrop complex, 30 to 70 percent slopes
BrF	Brodale flaggy very fine sandy loam, 45 to 80 percent slopes
CeA	Ceresco fine sandy loam, 0 to 3 percent slopes
CfA	Coffeen silt loam, 0 to 3 percent slopes
CnB	Council silt loam, 2 to 6 percent slopes
CnC	Council silt loam, 6 to 12 percent slopes
CnD	Council silt loam, 12 to 20 percent slopes
CnE	Council silt loam, 20 to 30 percent slopes
CuA	Curran silt loam, 0 to 3 percent slopes
Dc	Dawson peat
DdA	Dells silt loam, 0 to 3 percent slopes
DlA	Downs silt loam, 0 to 2 percent slopes
DlB	Downs silt loam, 2 to 6 percent slopes
DlC2	Downs silt loam, 6 to 12 percent slopes, eroded
DlD2	Downs silt loam, 12 to 20 percent slopes, eroded
ElC	Eleva sandy loam, 6 to 12 percent slopes
ElD	Eleva sandy loam, 12 to 20 percent slopes
ElE	Eleva sandy loam, 20 to 45 percent slopes
Et	Ettrick silt loam
GaC	Gale silt loam, 6 to 12 percent slopes
GaD	Gale silt loam, 12 to 20 percent slopes
HpA	Hoopeston sandy loam, 0 to 3 percent slopes
Hu	Houghton muck
ImA	Impact sand, 0 to 2 percent slopes
ImB	Impact sand, 2 to 6 percent slopes
IpA	Impact sand, moderately well drained, 0 to 3 percent slopes
JaA	Jackson silt loam, 0 to 2 percent slopes
JaB	Jackson silt loam, 2 to 6 percent slopes

SYMBOL	NAME
Ka	Kato silt loam
KpA	Kickapoo fine sandy loam, 0 to 3 percent slopes
LfC2	La Farge silt loam, 4 to 12 percent slopes, eroded
LfD2	La Farge silt loam, 12 to 20 percent slopes, eroded
Lw	Lows sandy loam
Lx	Loxley mucky peat
MaA	Meehan and Au Gres sands, 0 to 3 percent slopes
Mb	Menasha silty clay loam
MdA	Meridian loam, 0 to 2 percent slopes
MdB	Meridian loam, 2 to 6 percent slopes
Ne	Newson loamy sand
NlC2	Norden silt loam, 4 to 12 percent slopes, eroded
NlD2	Norden silt loam, 12 to 20 percent slopes, eroded
NuF	Norden, Urne, and Dorerton soils, 20 to 45 percent slopes
Pa	Palms muck
Pd	Pits
Pm	Psammaquents, nearly level
Ps	Psamments, nearly level
RbA	Reedsburg silt loam, 0 to 2 percent slopes
RbB	Reedsburg silt loam, 2 to 6 percent slopes
SfA	Shiffer loam, 0 to 3 percent slopes
TrB	Tarr sand, 0 to 6 percent slopes
TrC	Tarr sand, 6 to 12 percent slopes
TrD	Tarr sand, 12 to 20 percent slopes
TrE	Tarr sand, 20 to 45 percent slopes
TsA	Tarr sand, moderately well drained, 0 to 3 percent slopes
UfC2	Urne fine sandy loam, 4 to 12 percent slopes, eroded
UfD2	Urne fine sandy loam, 12 to 20 percent slopes, eroded
VaB	Valton silt loam, 2 to 6 percent slopes
VaC2	Valton silt loam, 6 to 12 percent slopes, eroded
VaD2	Valton silt loam, 12 to 20 percent slopes, eroded
VwE	Valton-Wildale silt loams, 20 to 45 percent slopes
Wa	Wautoma sand
WdB	Wildale silt loam, 2 to 6 percent slopes
WdC2	Wildale cherty silt loam, 6 to 12 percent slopes, eroded
WdD2	Wildale cherty silt loam, 12 to 20 percent slopes, eroded
WeA	Wyeville loamy sand, 0 to 3 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- County
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate
- Federal
- State
- County

RAILROAD

LEVEES

- Without road

DAMS

- Medium or small (water; w)

PITS

- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial (water; w)

MISCELLANEOUS WATER FEATURES

- Wet spot

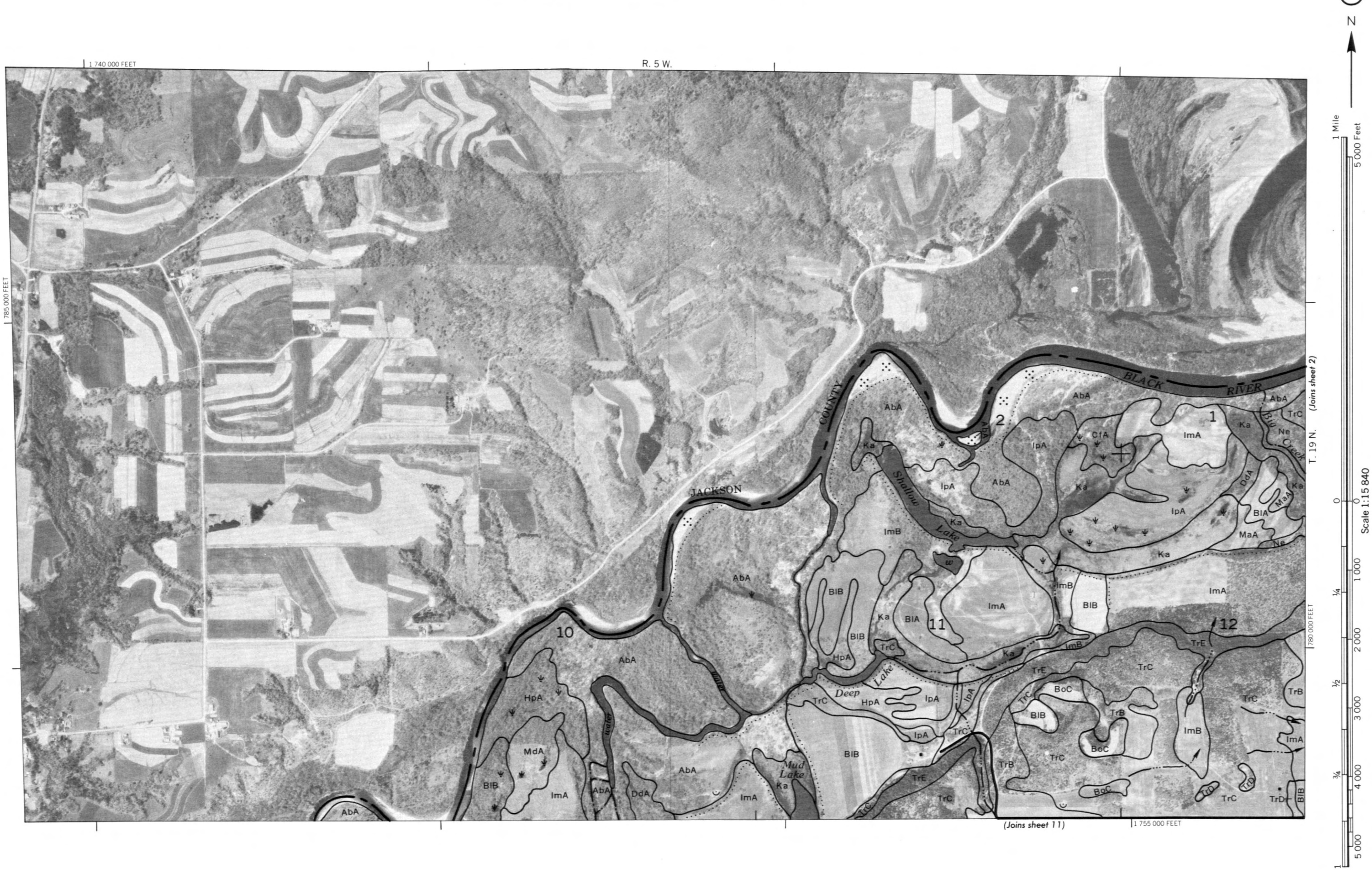
SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (TrB; DlD2)

SHORT STEEP SLOPE

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Rock outcrop (includes sandstone and shale)
- Sandy spot
- Severely eroded spot


1
N
1 740 000 FEET
R. 5 W.
785 000 FEET
780 000 FEET
1 755 000 FEET
T. 19 N.
(Joins sheet 2)
(Joins sheet 11)
BLACK RIVER
Big Creek
COUNTY
JACKSON
Shallow Lake
Deep Lake
Mud Lake
water
AbA
ImA
ImB
IpA
CfA
Ka
DdA
BlA
MaA
Ne
TrC
TrB
TrD
TrE
BlB
HpA
MdA
BoC
1
2
10
11
12
1 Mile
5 000 Feet
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
Scale 1:15 840


N
R. 5 W. | R. 4 W.
JACKSON COUNTY
1 775 000 FEET
785 000 FEET
T. 19 N.
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 12)
1 760 000 FEET
780 000 FEET
Scale 1:15 840
1 Mile
5 000 Feet
BLACK RIVER
JACKSON COUNTY
Water
Big Creek
Printz Creek
1
4
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6
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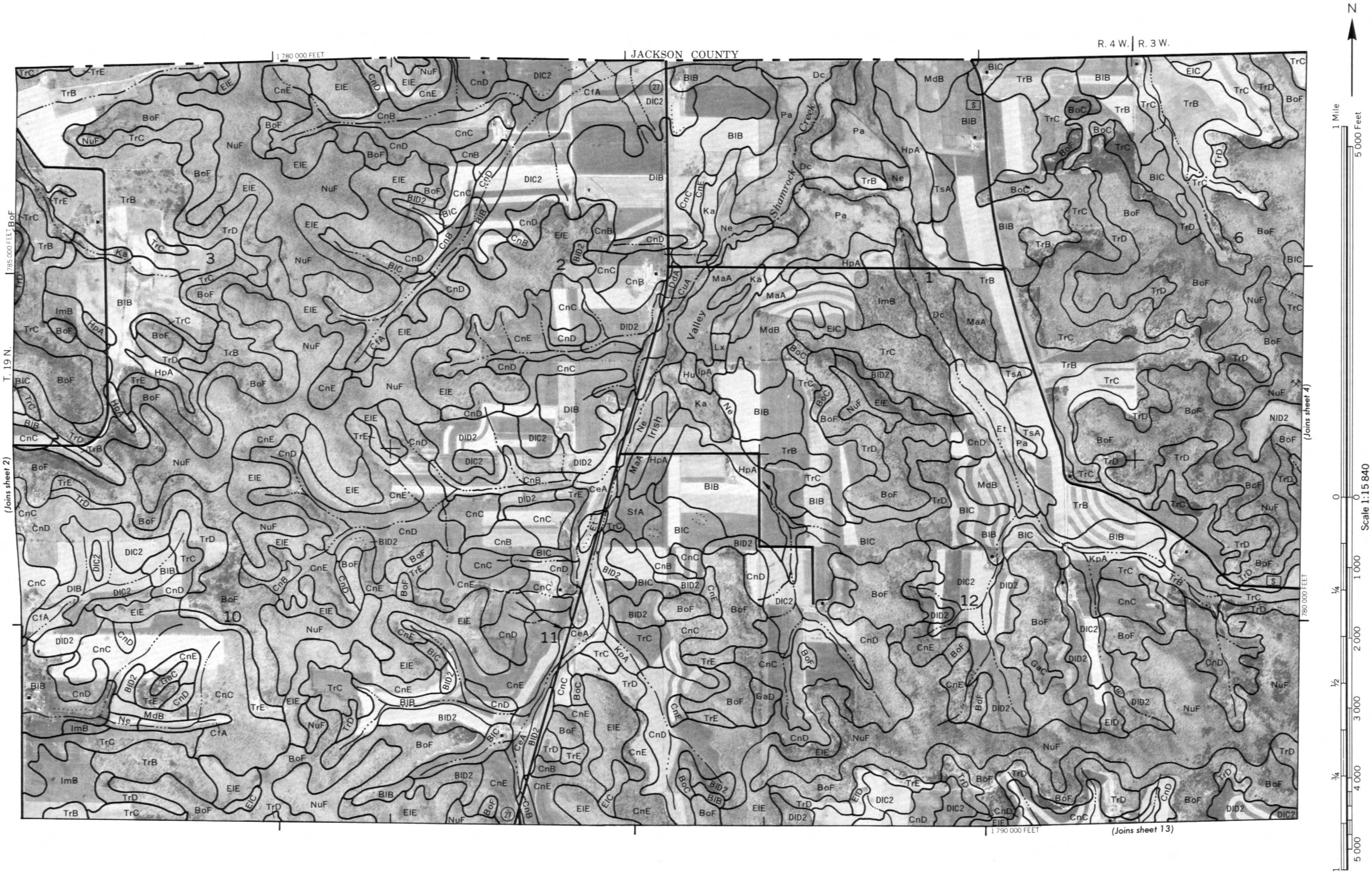
8
9
12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JACKSON COUNTY
R. 4 W.
R. 3 W.
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785 000 FEET
T. 19 N.
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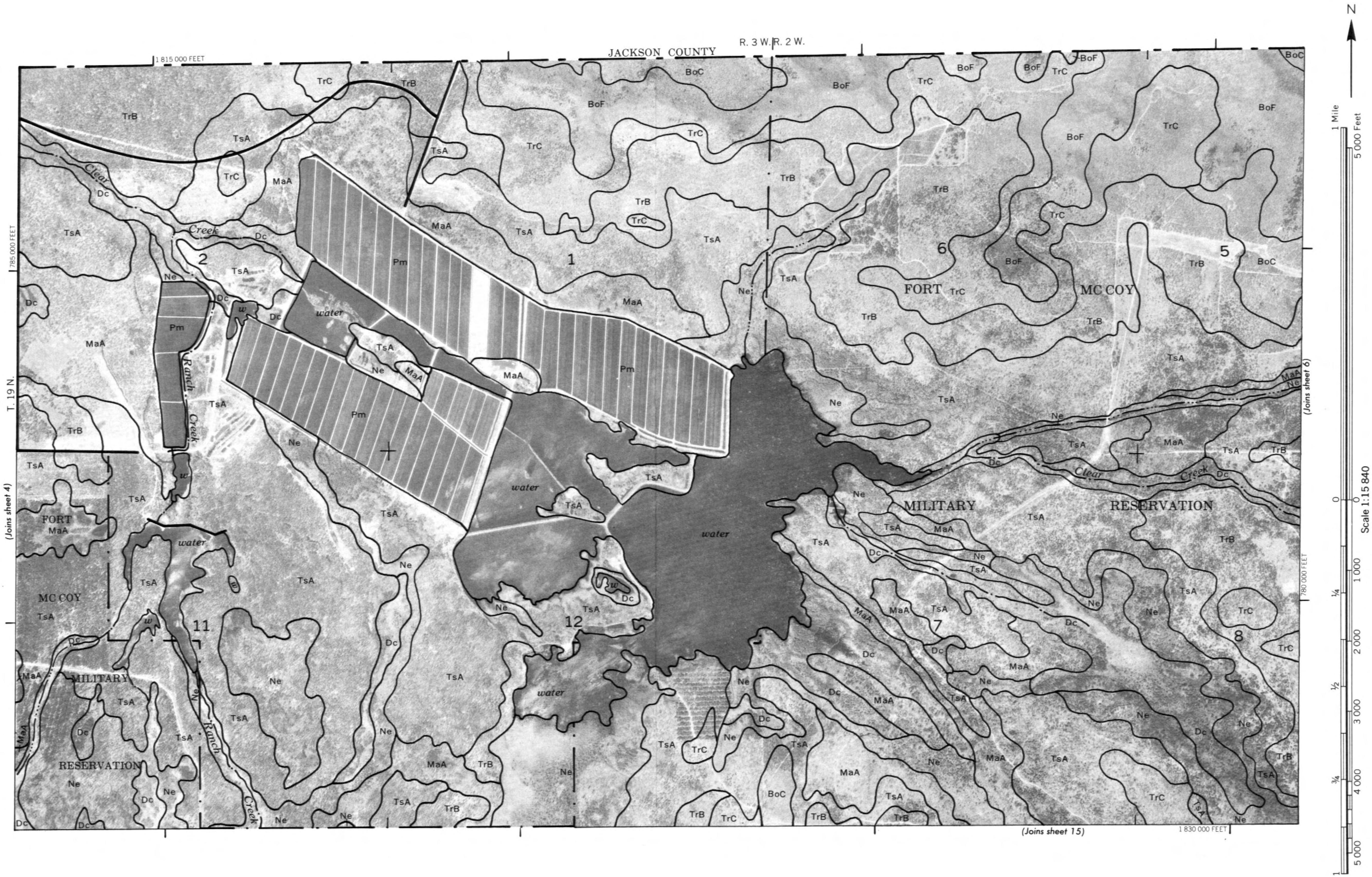
(Joins sheet 4)
(Joins sheet 13)
1 790 000 FEET
780 000 FEET
Shamrock Creek
Irish Valley
1 Mile
5 000 Feet
0
¼
½
¾
1 000
2 000
3 000
4 000
5 000
Scale 1:15 840


N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
JACKSON COUNTY
R. 3 W.
1 810 000 FEET
785 000 FEET
T. 19 N.
780 000 FEET
1 795 000 FEET
(Joins sheet 3)
(Joins sheet 5)
(Joins sheet 14)
FORT
MC COY
MILITARY
RESERVATION
Clear Creek
6
5
4
3
7
8
9
10



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JACKSON COUNTY
R. 3 W. R. 2 W.
1 815 000 FEET
785 000 FEET
T. 19 N.
(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 15)
780 000 FEET
1 830 000 FEET
FORT MC COY
MILITARY RESERVATION
Clear Creek
Ranch Creek
water
1
2
5
6
7
8
11
12
TrB
TrC
TsA
MaA
Dc
Ne
Pm
BoC
BoF
w
1 Mile
5 000 Feet
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¼
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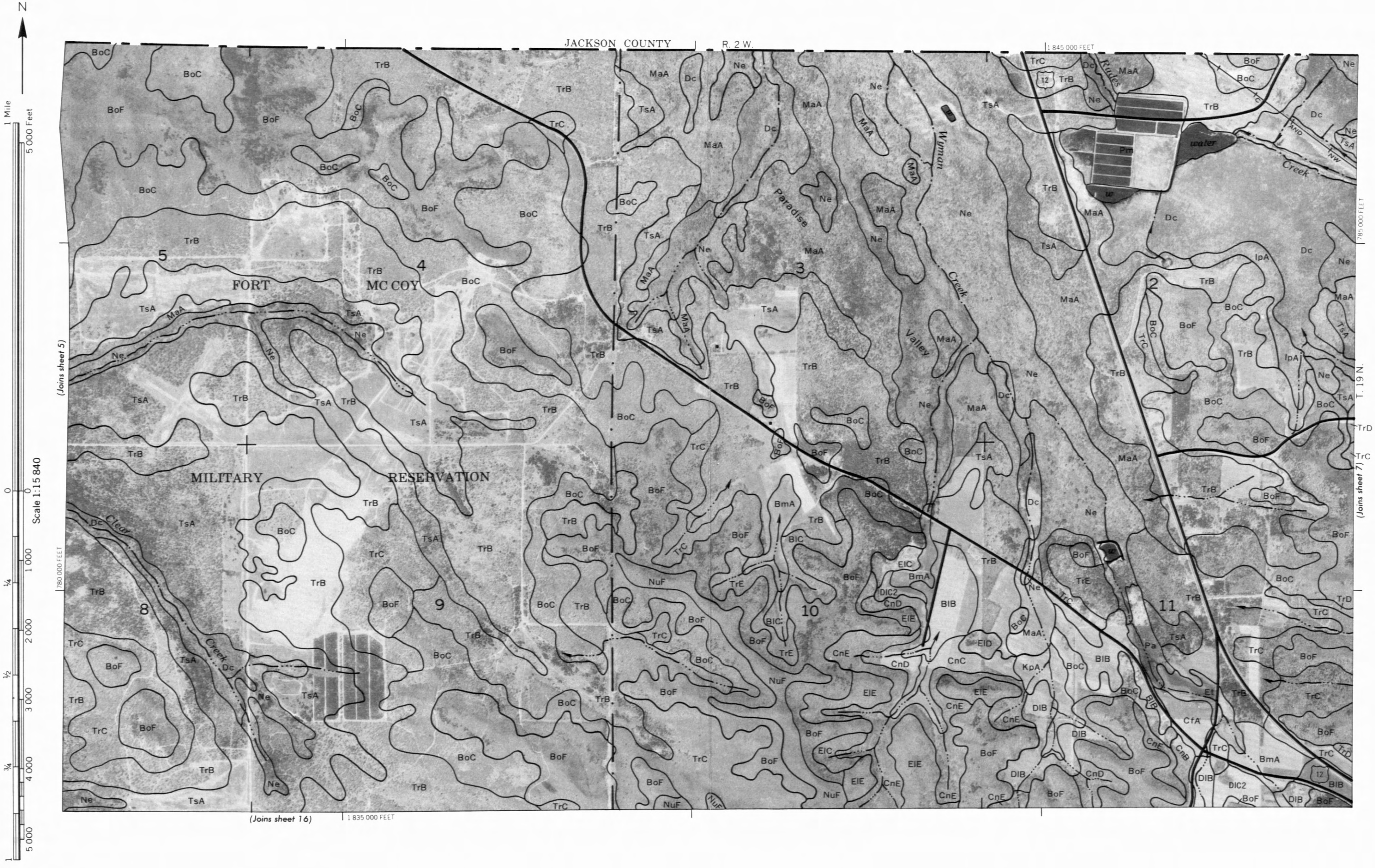
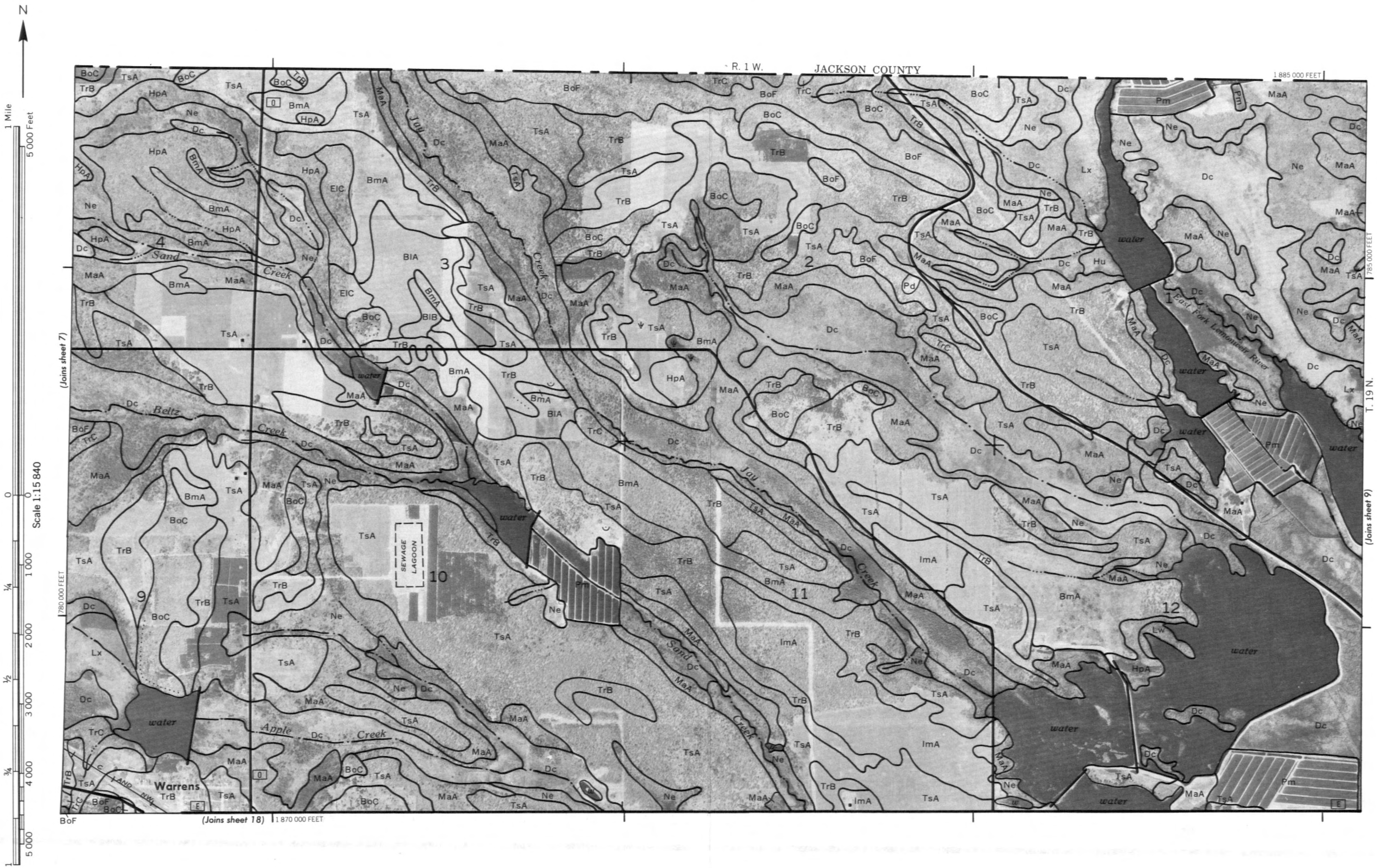
¾
1 000
2 000
3 000
4 000
5 000
Scale 1:15 840

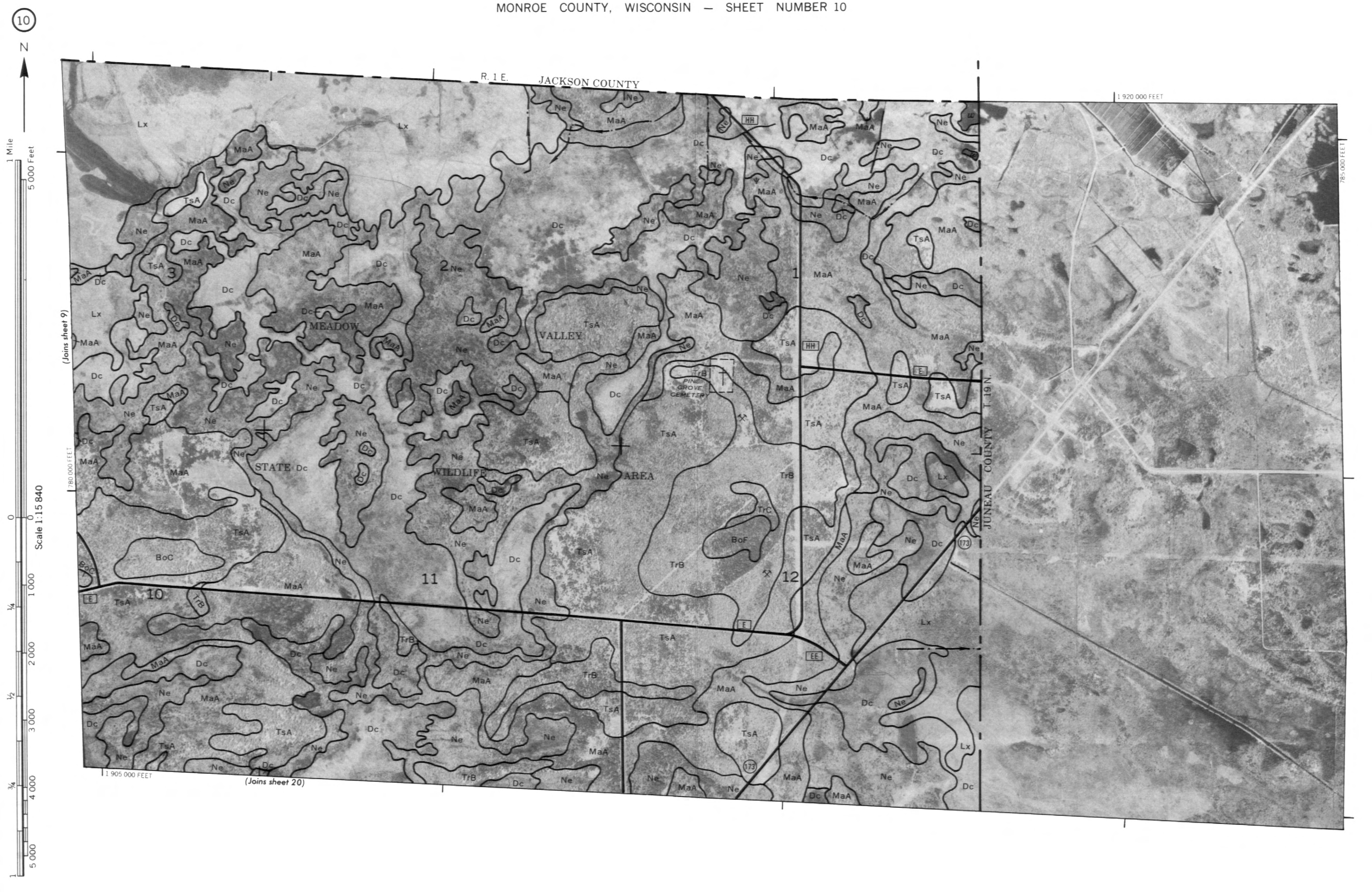

N
JACKSON COUNTY
R. 2 W.
1 845 000 FEET
785 000 FEET
780 000 FEET
1 835 000 FEET
T. 19 N.
(Joins sheet 5)
(Joins sheet 7)
(Joins sheet 16)
FORT MC COY
MILITARY RESERVATION
Paradise Valley
Wyman Creek
Clear Creek
Rudes Creek
water
Scale 1:15 840
1 Mile
5 000 Feet
0
1 000
2 000
3 000
4 000
5 000
1/4
1/2
3/4
1


N
R. 2 W. | R. 1 W.
JACKSON COUNTY
1 850 000 FEET
785 000 FEET
780 000 FEET
1 865 000 FEET
T. 19 N.
(Joins sheet 6)
(Joins sheet 8)
(Joins sheet 17)
Wazeda
Lake
Castle
Rock
Beltz
Creek
CHICAGO AND NORTHWESTERN
water
94
12
1 Mile
5 000 Feet
Scale 1:15 840

8


N
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000
R. 1 W.
JACKSON COUNTY
1 885 000 FEET
785 000 FEET
T. 19 N.
(Joins sheet 7)
(Joins sheet 9)
(Joins sheet 18)
1 870 000 FEET
780 000 FEET
Sand Creek
Jay Creek
Beltz Creek
Apple Creek
East Fork Lemonweir River
SEWAGE LAGOON
Warrens
water
1
2
3
4
9
10
11
12


R. 1 E.
JACKSON COUNTY
T. 19 N.
1 890 000 FEET
1 900 000 FEET
785 000 FEET
780 000 FEET
MEADOW VALLEY STATE WILDLIFE AREA
Scott Flowage
Stanley Hill
Dead Creek
East Fork Lemonweir River
water
(Joins sheet 8)
(Joins sheet 10)
(Joins sheet 19)
N
1 Mile
5 000 Feet
Scale 1:15 840


10
N
R. 1 E.
JACKSON COUNTY
JUNEAU COUNTY
T. 19 N.
1 920 000 FEET
785 000 FEET
780 000 FEET
1 905 000 FEET
(Joins sheet 9)
(Joins sheet 20)
MEADOW
VALLEY
STATE
WILDLIFE
AREA
PINE GROVE CEMETERY
1 Mile
5 000 Feet
Scale 1:15 840
0
1000
2000
3000
4000
5000
1/4
1/2
3/4
1
HH
E
EE
173

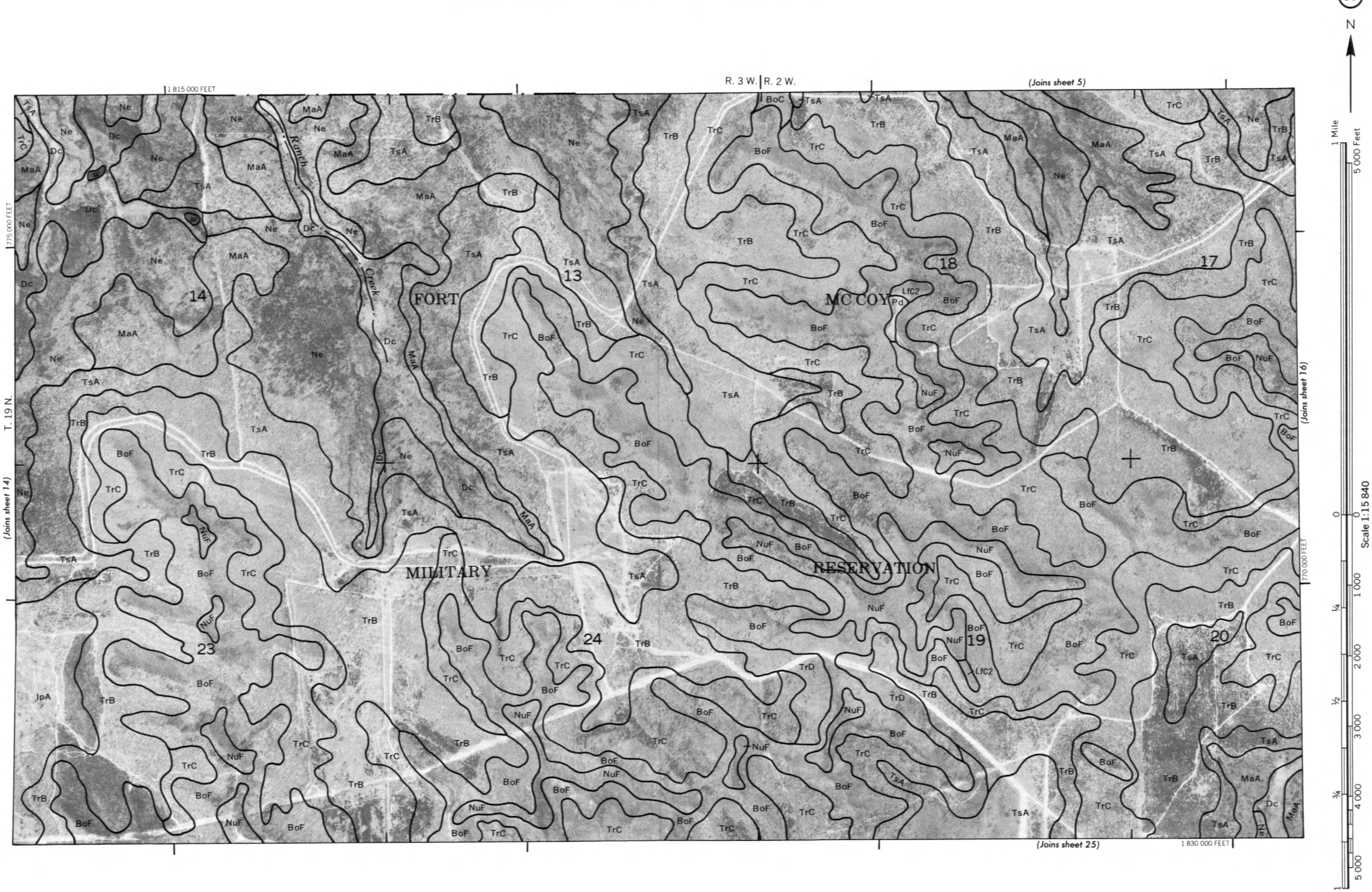

11
N
1 740 000 FEET
775 000 FEET
R. 5 W.
(Joins sheet 1)
(Joins sheet 12)
(Joins sheet 21)
770 000 FEET
1 775 000 FEET
JACKSON COUNTY
T. 19 N.
Black
Mud Lake
15
14
13
22
23
24
1 Mile
5 000 Feet
Scale 1:15 840
¼
½
¾
1 000
2 000
3 000
4 000
5 000

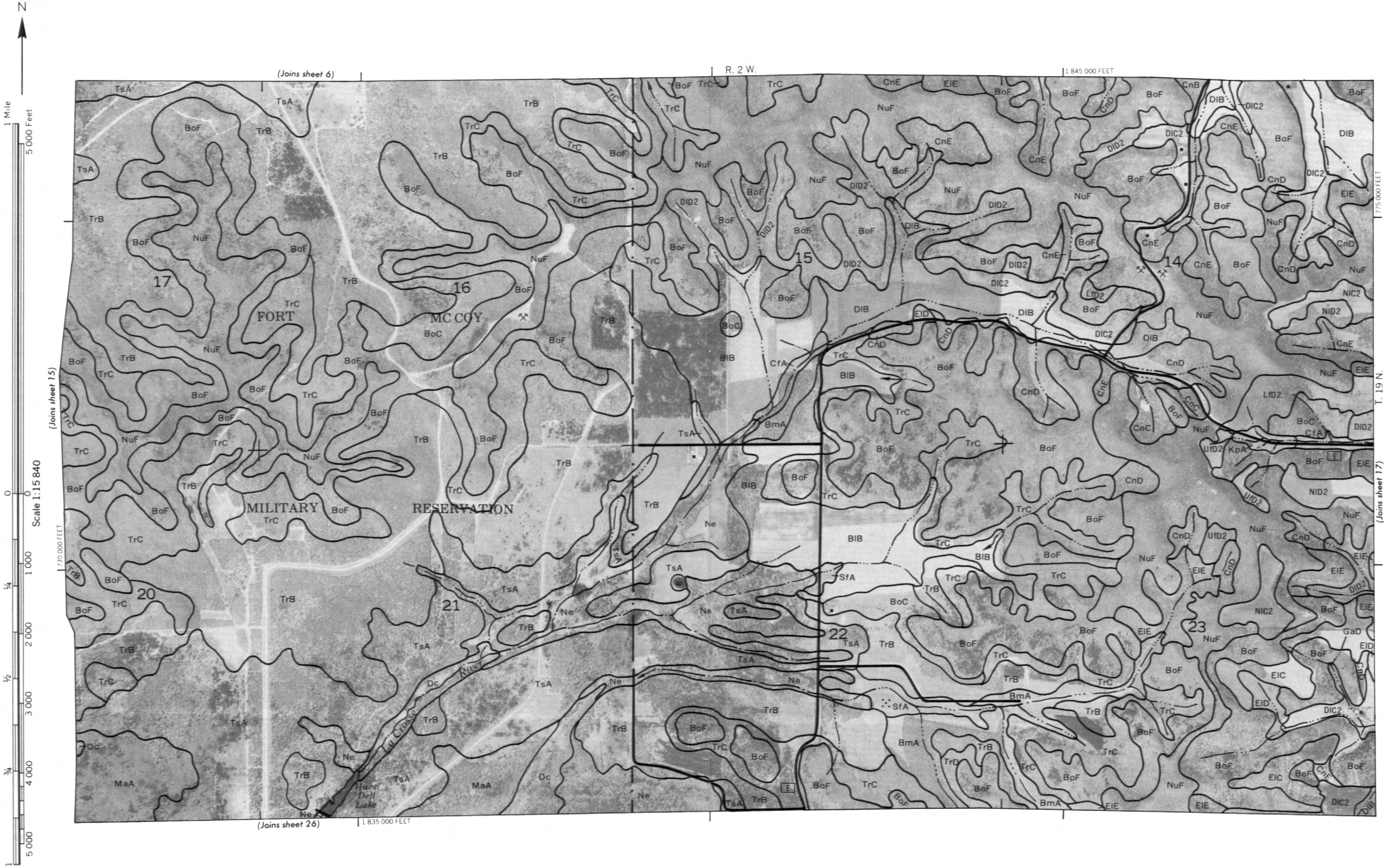

12
N
R. 5 W. R. 4 W.
(Joins sheet 2)
(Joins sheet 11)
(Joins sheet 13)
(Joins sheet 22)
T. 19 N.
1 775 000 FEET
1 760 000 FEET
Scale 1:15 840
1 Mile
5 000 Feet

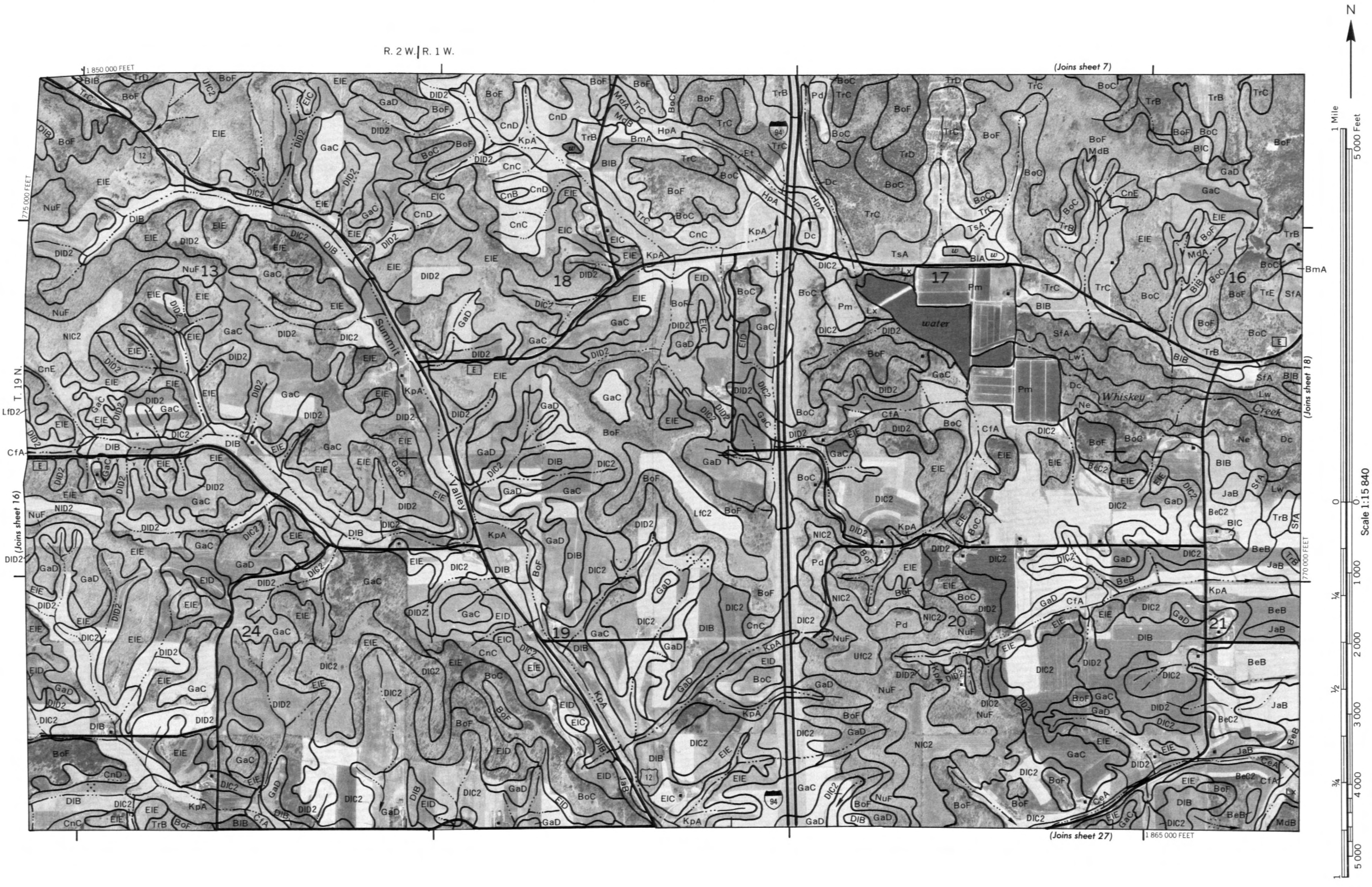

13
N
(Joins sheet 3)
R. 4 W.
R. 3 W.
1 780 000 FEET
1 790 000 FEET
775 000 FEET
770 000 FEET
T. 19 N.
(Joins sheet 12)
(Joins sheet 14)
(Joins sheet 23)
Daneville
Valley
Dustin
Creek
15
14
13
18
22
23
24
19
1 Mile
5 000 Feet
Scale 1:15 840

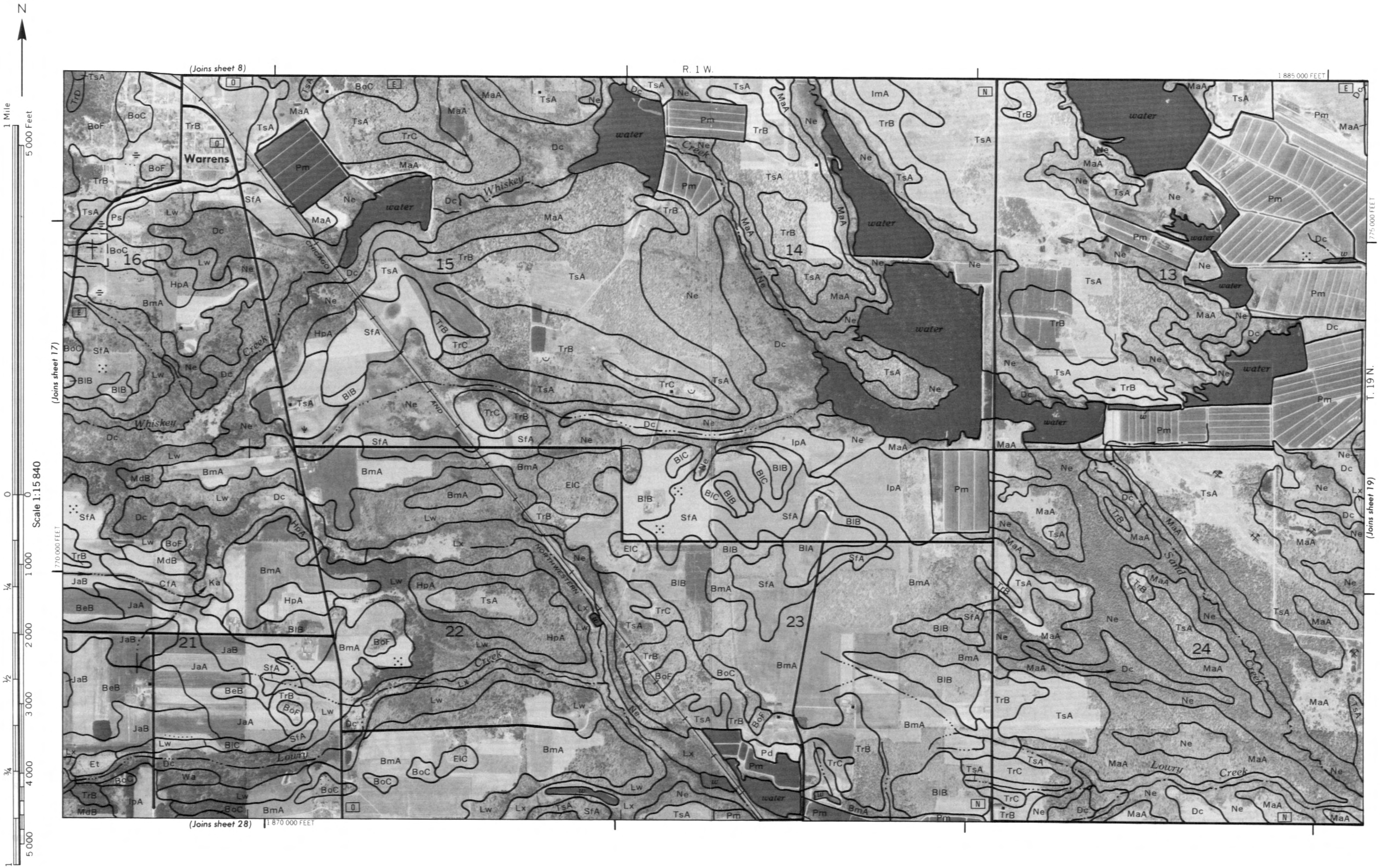

N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 4)
R. 3 W.
1 810 000 FEET
775 000 FEET
770 000 FEET
T. 19 N.
(Joins sheet 13)
(Joins sheet 15)
(Joins sheet 24)
1 795 000 FEET
FORT
MC COY
MILITARY
RESERVATION
15
16
17
18
19
20
21
22

MONROE COUNTY, WISCONSIN — SHEET NUMBER 15

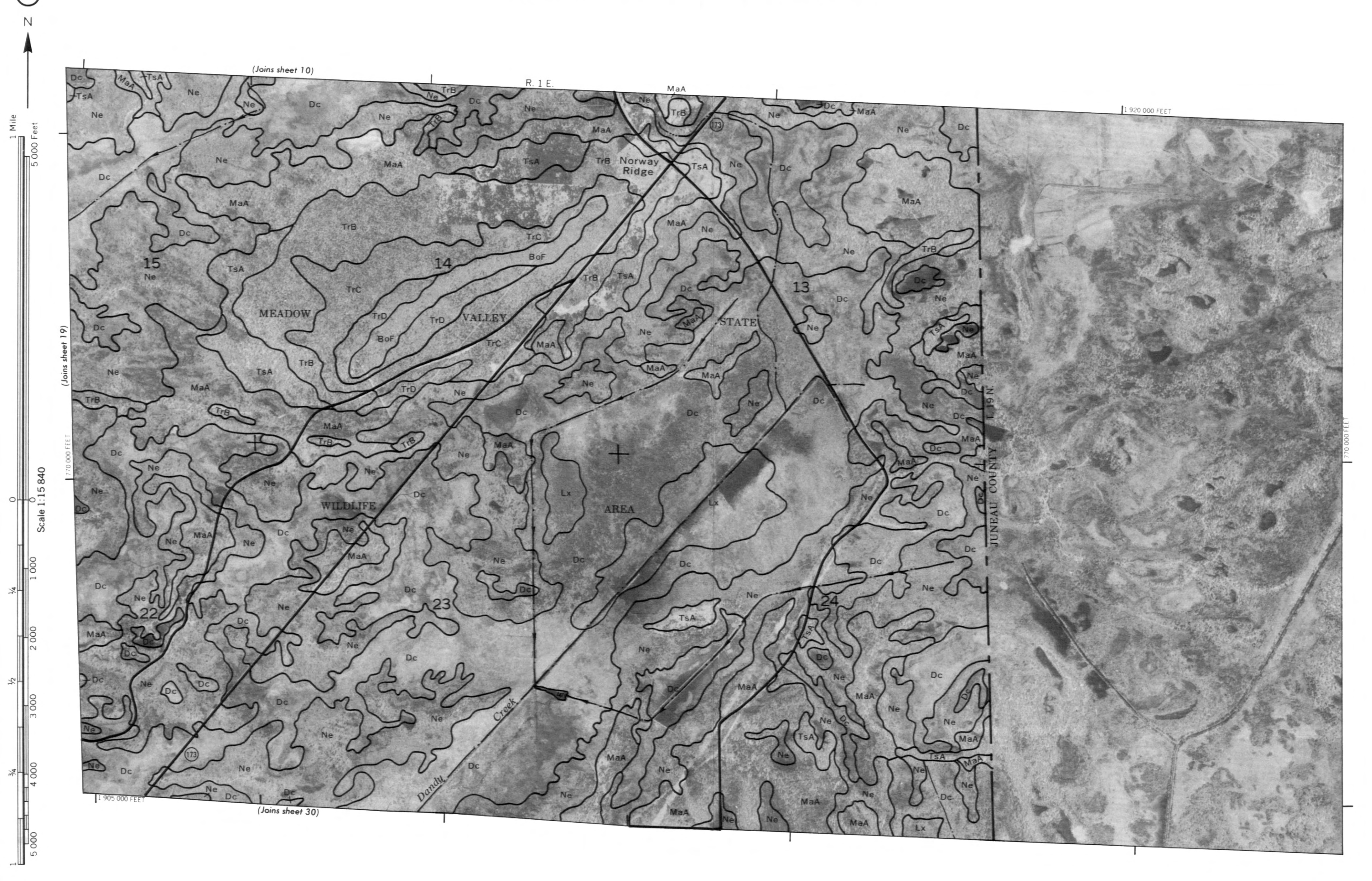


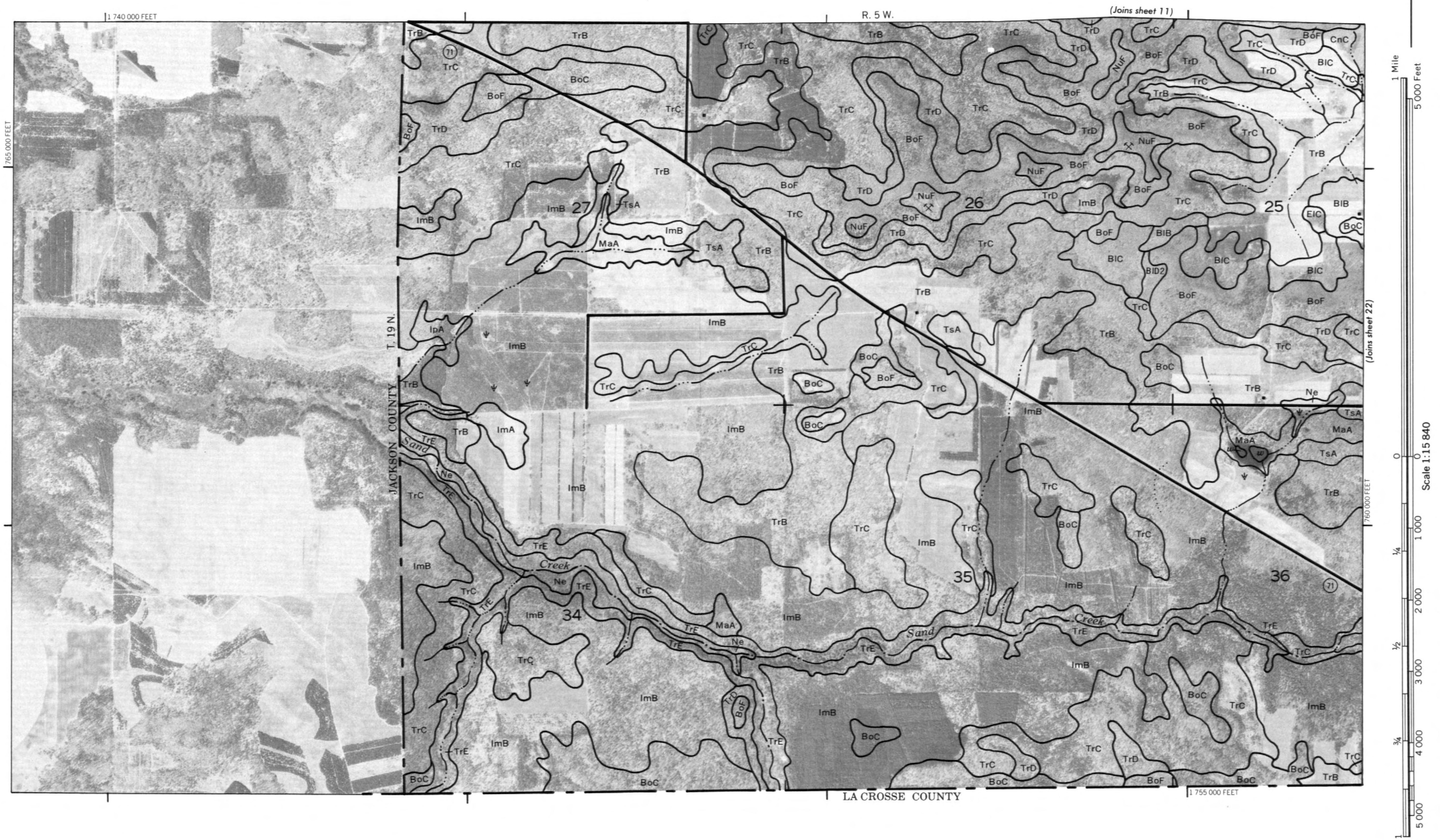

N
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000
(Joins sheet 6)
(Joins sheet 15)
(Joins sheet 17)
(Joins sheet 26)
R. 2 W.
T. 19 N.
1 845 000 FEET
1 835 000 FEET
775 000 FEET
770 000 FEET
FORT
MC COY
MILITARY
RESERVATION
La Crosse River
Hazel Dell Lake
14
15
16
17
20
21
22
23


N
R. 2 W. | R. 1 W.
1 850 000 FEET
(Joins sheet 7)
775 000 FEET
T. 19 N.
(Joins sheet 16)
(Joins sheet 18)
770 000 FEET
(Joins sheet 27)
1 865 000 FEET
Summit
Valley
Whiskey
Creek
water
1 Mile
5 000 Feet
Scale 1:15 840


18
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 8)
(Joins sheet 17)
(Joins sheet 19)
(Joins sheet 28)
R. 1 W.
T. 19 N.
1 885 000 FEET
1 870 000 FEET
775 000 FEET
770 000 FEET
Warrens
Whiskey Creek
Sand Creek
Lowry Creek
CHICAGO AND NORTHWESTERN
water
13
14
15
16
21
22
23
24


N
1 890 000 FEET
R. 1 E.
(Joins sheet 9)
(Joins sheet 18)
(Joins sheet 20)
(Joins sheet 29)
T. 19 N.
275 000 FEET
770 000 FEET
1 900 000 FEET
water
w
MEADOW
VALLEY
STATE
WILDLIFE
AREA
Dead Creek
Lemonweir River
East Fork
Sand Creek
15
16
17
18
19
20
21
22
MaA
Dc
Lx
Pm
TsA
Ne
BoC
TrB
TrC
HpA
Scale 1:15 840
1 Mile
5 000 Feet
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1

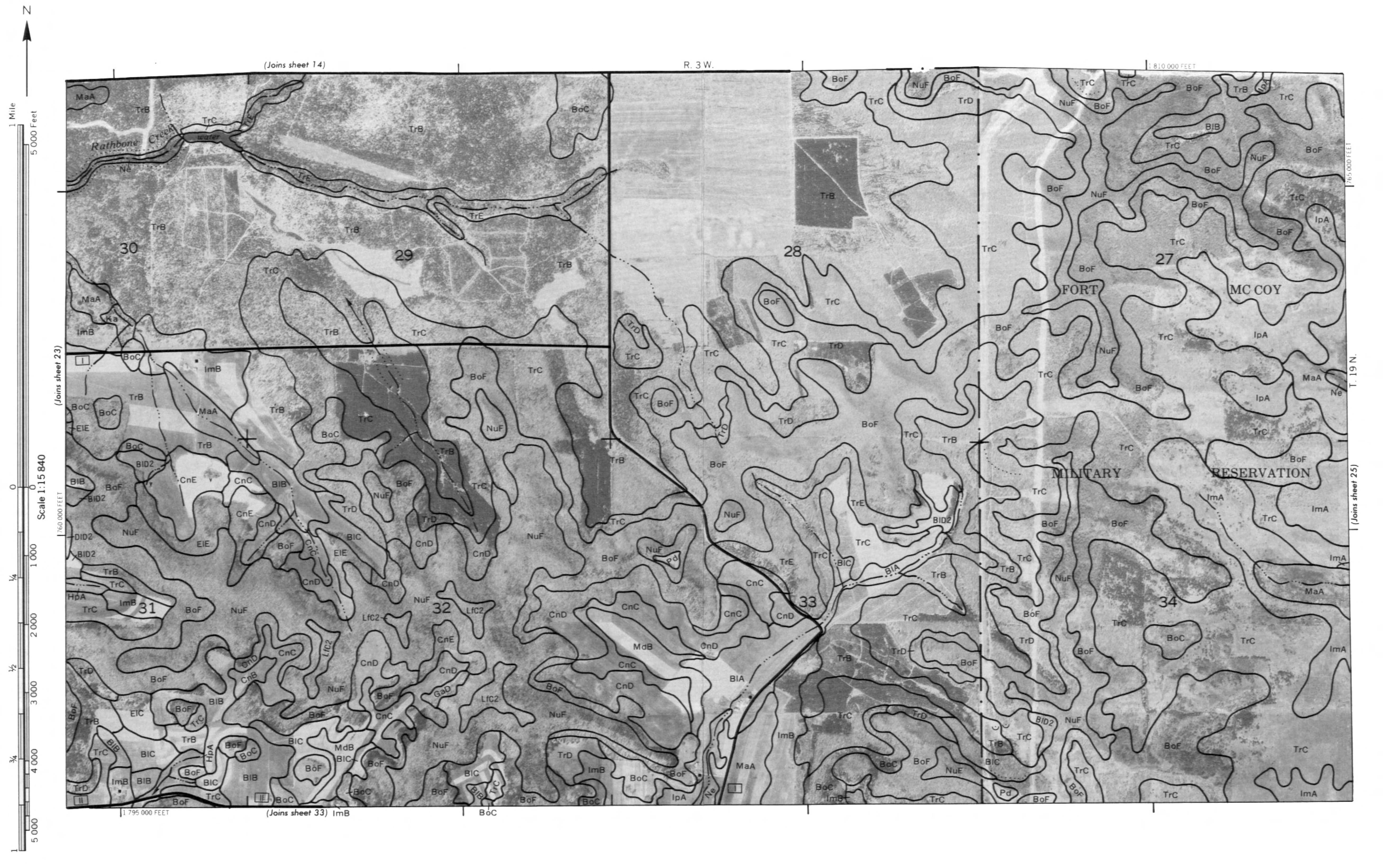

20
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 10)
(Joins sheet 19)
(Joins sheet 30)
R. 1 E.
T. 19 N.
1 920 000 FEET
1 905 000 FEET
770 000 FEET
MEADOW
VALLEY
WILDLIFE
STATE
AREA
Norway Ridge
JUNEAU COUNTY
Dandy Creek
15
14
13
22
23
24
173


21
N
R. 5 W.
(Joins sheet 11)
(Joins sheet 22)
T. 19 N.
JACKSON COUNTY
LA CROSSE COUNTY
1 740 000 FEET
765 000 FEET
1 755 000 FEET
760 000 FEET
Sand Creek
25
26
27
34
35
36
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000


22
N
R. 5 W. | R. 4 W.
(Joins sheet 12)
(Joins sheet 21)
(Joins sheet 23)
(Joins sheet 31)
T. 19 N.
1 775 000 FEET
765 000 FEET
760 000 FEET
1 760 000 FEET
LA CROSSE COUNTY
Big Creek
Sand Creek
Spencer Creek
25
29
28
30
31
32
33
36
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
1/4
1/2
3/4
1

23


(Joins sheet 13)
R. 4 W. | R. 3 W.
1 780 000 FEET
765 000 FEET
T. 19 N.
(Joins sheet 22)
(Joins sheet 24)
(Joins sheet 32)
1 790 000 FEET
760 000 FEET
Cataract
Rathbone Creek
Dustin Creek
Evans Pond
27
26
25
30
34
35
36
31
N
1 Mile
5 000 Feet
Scale 1:15 840


24
N
(Joins sheet 14)
R. 3 W.
(Joins sheet 23)
(Joins sheet 25)
(Joins sheet 33)
T. 19 N.
Scale 1:15 840
1 Mile
5 000 Feet
1 810 000 FEET
765 000 FEET
760 000 FEET
1 795 000 FEET
Rathbone Creek
water
FORT MC COY
MILITARY RESERVATION
30
29
28
27
31
32
33
34


25
N
1 815 000 FEET
R. 3 W. R. 2 W.
(Joins sheet 15)
765 000 FEET
T. 19 N.
(Joins sheet 24)
(Joins sheet 26)
760 000 FEET
(Joins sheet 34)
1 830 000 FEET
FORT
MC COY
MILITARY
RESERVATION
La Crosse
River
Alderwood Lake
26
25
30
29
35
36
31
32
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
½
¾
1 000
2 000
3 000
4 000
5 000
BoF
TrC
TrB
TsA
MaA
Ne
IpA
ImA
ImB
BoC
NuF
Dc

MONROE COUNTY, WISCONSIN — SHEET NUMBER 26


27
N
R. 2 W. | R. 1 W.
(Joins sheet 17)
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 36)
T. 19 N.
1 850 000 FEET
1 865 000 FEET
765 000 FEET
760 000 FEET
Kirby
Summit
Valley
1 Mile
5 000 Feet
Scale 1:15 840

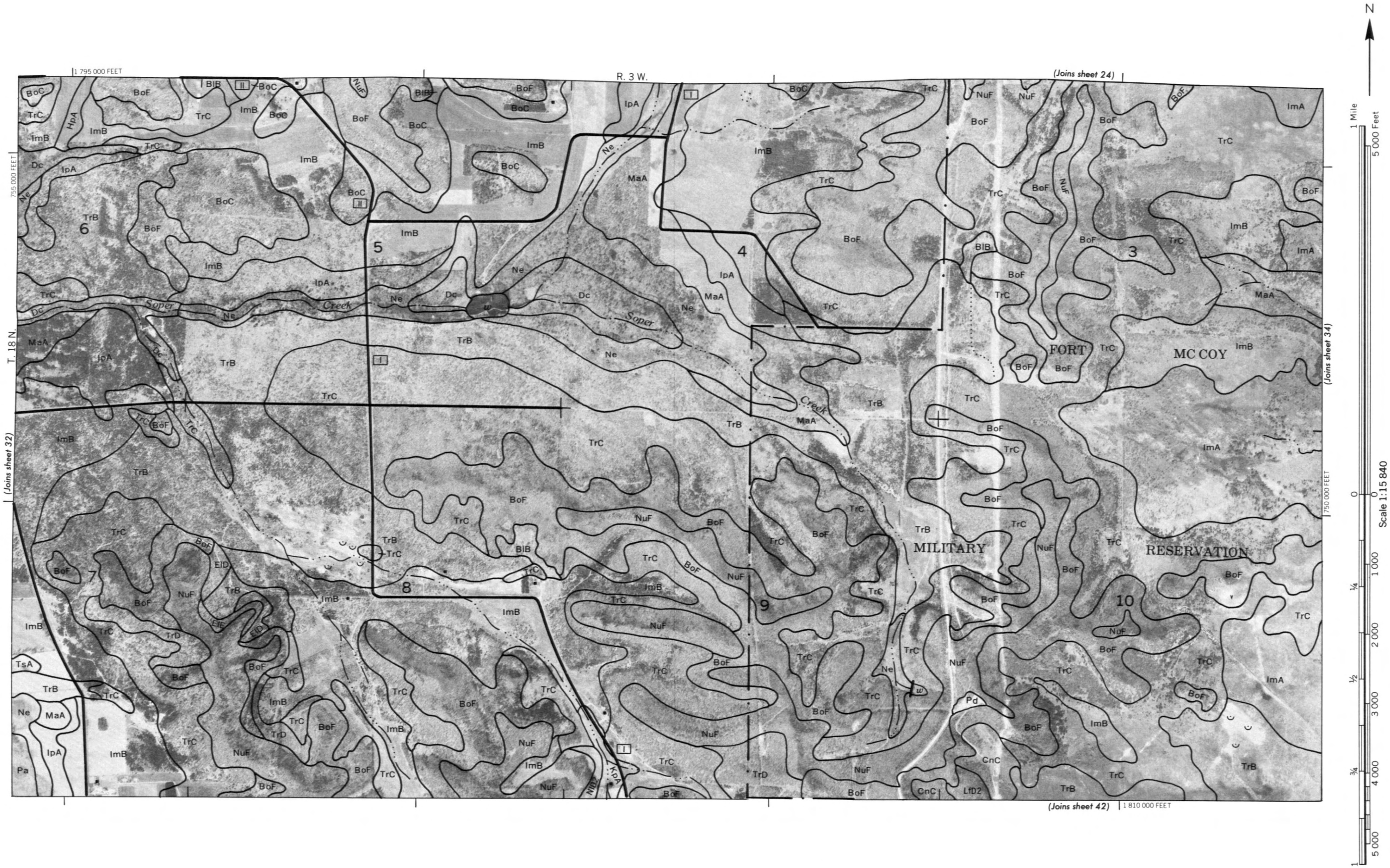
MONROE COUNTY, WISCONSIN — SHEET NUMBER 28


N
R. 1 E.
T. 19 N.
1 890 000 FEET
1 900 000 FEET
765 000 FEET
755 000 FEET
(Joins sheet 19)
(Joins sheet 28)
(Joins sheet 30)
(Joins sheet 38)
Sand Creek
East Fork Lemonweir River
Lemonweir River
Dead Creek
MEADOW VALLEY STATE WILDLIFE AREA
Monroe County Flowage
water
173
27
28
29
30
31
32
33
34
Scale 1:15 840
1 Mile
5 000 Feet
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
MaA
Ne
Dc
TsA
TrB
Lx
HpA
BmA
Wa
Pa
Pm
w


N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2000
3000
4000
5 000
(Joins sheet 20)
R. 1 E.
1 920 000 FEET
760 000 FEET
(Joins sheet 29)
(Joins sheet 39)
1 905 000 FEET
755 000 FEET
T. 19 N.
JUNEAU COUNTY
173
27
26
25
34
35
36
MEADOW
VALLEY
STATE
WILDLIFE
AREA
Dandy Creek
Monroe County Flowage
Dc
Ne
MaA
TsA
IpA
CfA
Wa
WeA
BnA
Pa
Lx
w


N
(Joins sheet 22)
(Joins sheet 32)
(Joins sheet 40)
R. 4 W.
T. 18 N.
LA CROSSE COUNTY
1 760 000 FEET
1 775 000 FEET
755 000 FEET
750 000 FEET
Scale 1:15 840
1 Mile
5 000 Feet
Spencer
Brackett
Creek
Valley

MONROE COUNTY, WISCONSIN — SHEET NUMBER 32

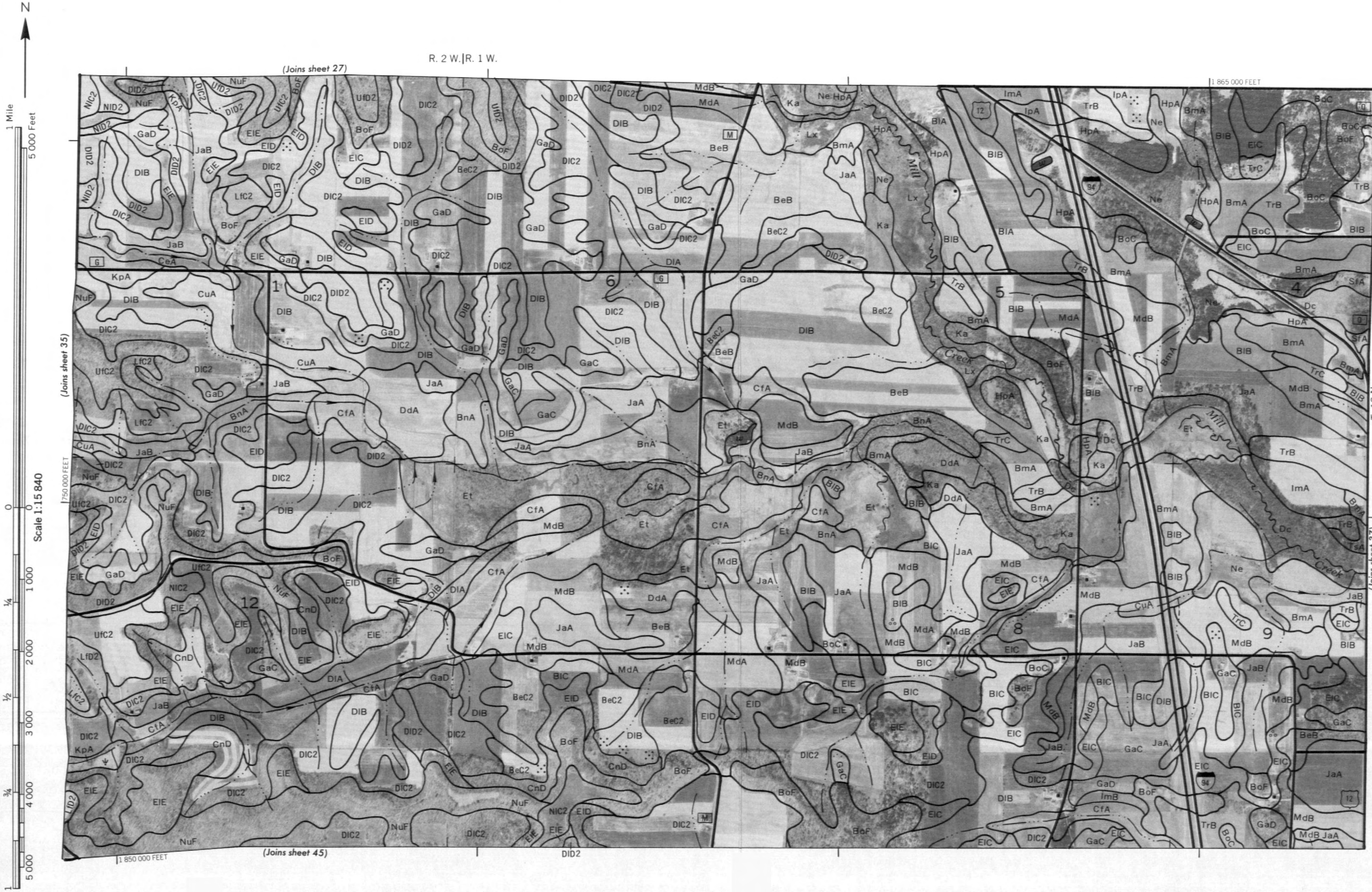

N
1 795 000 FEET
R. 3 W.
(Joins sheet 24)
755 000 FEET
T. 18 N.
(Joins sheet 32)
(Joins sheet 34)
750 000 FEET
(Joins sheet 42)
1 810 000 FEET
Soper Creek
Soper Creek
FORT MC COY
MILITARY RESERVATION
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
½
¾
1 000
2 000
3 000
4 000
5 000

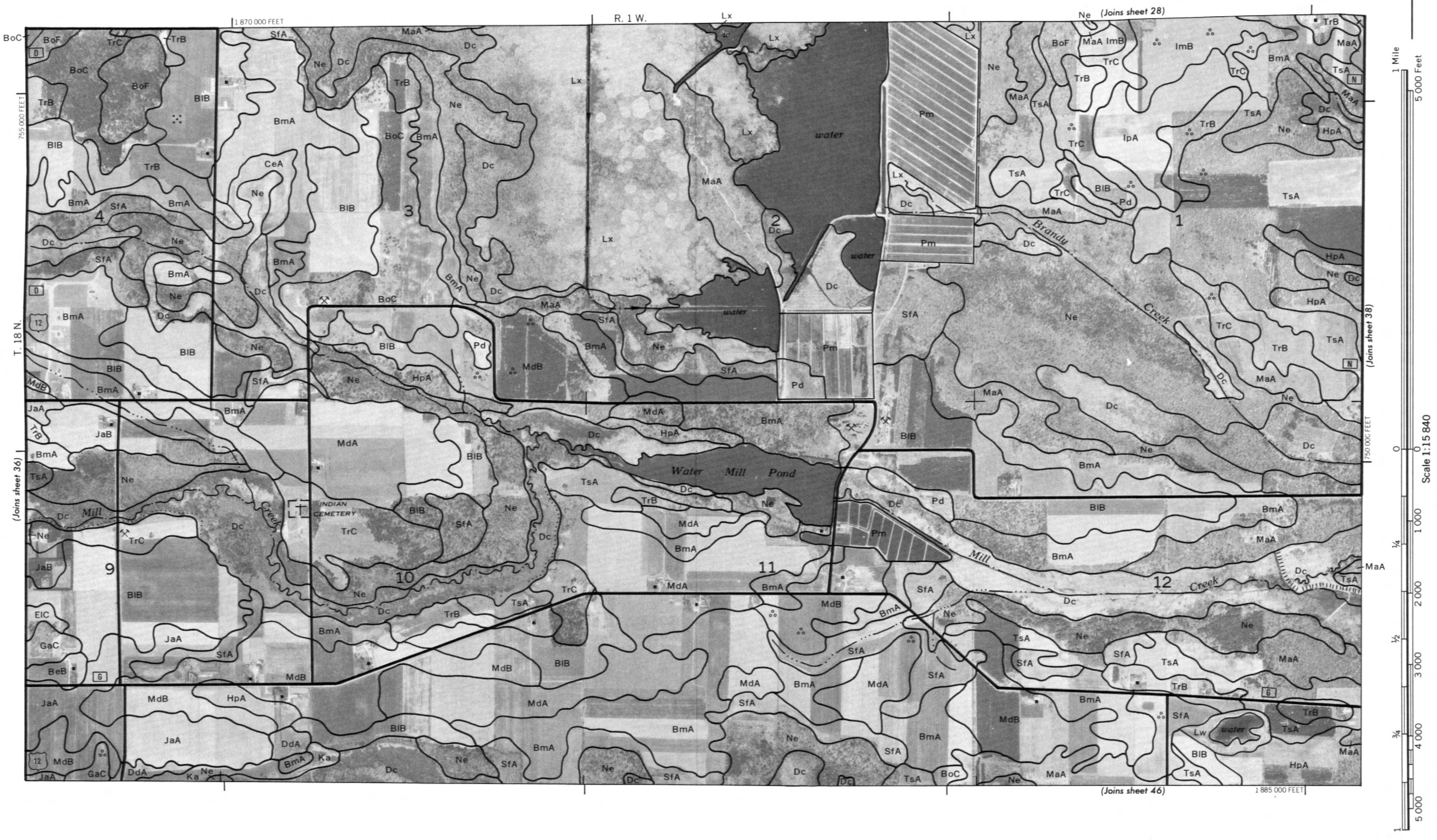
34


N
(Joins sheet 25)
R. 3 W. | R. 2 W.
1 830 000 FEET
755 000 FEET
T. 18 N.
(Joins sheet 35)
(Joins sheet 33)
750 000 FEET
1 815 000 FEET
(Joins sheet 43)
FORT
MC COY
MILITARY
RESERVATION
La Crosse River
Squaw Creek
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1

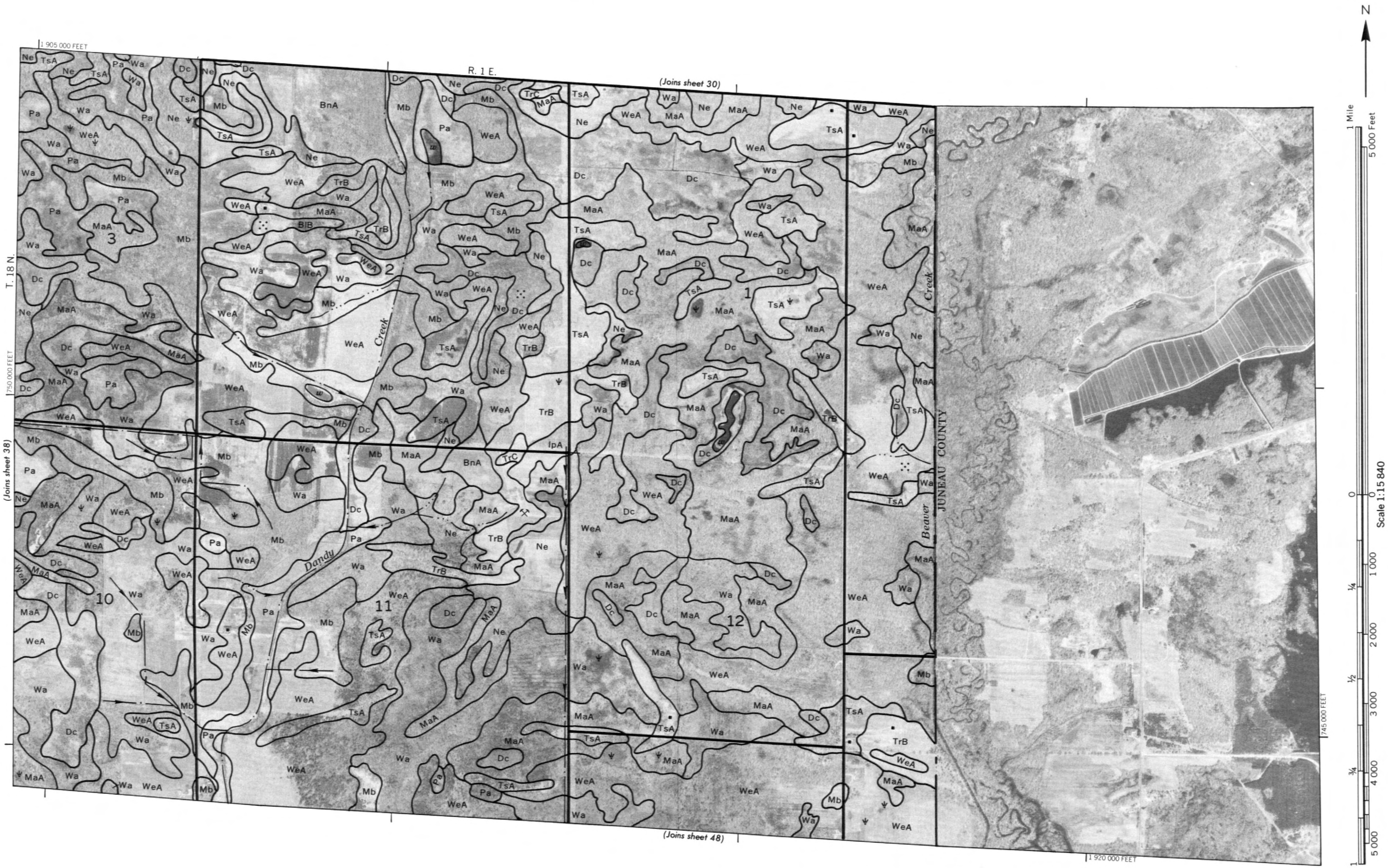

35
N
(Joins sheet 26)
(Joins sheet 36)
(Joins sheet 44)
(Joins sheet 34)
R. 2 W.
T. 18 N.
1 835 000 FEET
1 845 000 FEET
755 000 FEET
750 000 FEET
FORT
MC COY
MILITARY
RESERVATION
Squaw
Creek
2
3
4
5
8
9
10
11
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
½
¾
1
1 000
2 000
3 000
4 000
5 000
TrB
TrC
BoF
NuF
BIB
BID2
Pd
CnE
LfC2
CeA
TsA
DIB
DIA
CfA
Ne
Dc
CnD
BIC
DdA
WdB
UfD2
KpA
LfD2
DIC2
DID2
UfC2
VaC2
BrF
NIC2
NID2
CnC
LfC2
AtB
CeA
EIE
CuA
WdC2
VaB
CfA

MONROE COUNTY, WISCONSIN — SHEET NUMBER 36




37
N
R. 1 W.
T. 18 N.
1 870 000 FEET
755 000 FEET
750 000 FEET
1 885 000 FEET
(Joins sheet 28)
(Joins sheet 38)
(Joins sheet 46)
(Joins sheet 36)
Water Mill Pond
Brandy Creek
Mill Creek
INDIAN CEMETERY
water
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
1/4
1/2
3/4
1


N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 29)
R. 1 E.
1 900 000 FEET
(Joins sheet 37)
(Joins sheet 39)
(Joins sheet 47)
1 890 000 FEET
750 000 FEET
T. 18 N.
Valley Junction
Brandu
Creek
East Fork
Dead Creek
Lemonweir River
CHICAGO AND NORTHWESTERN
water

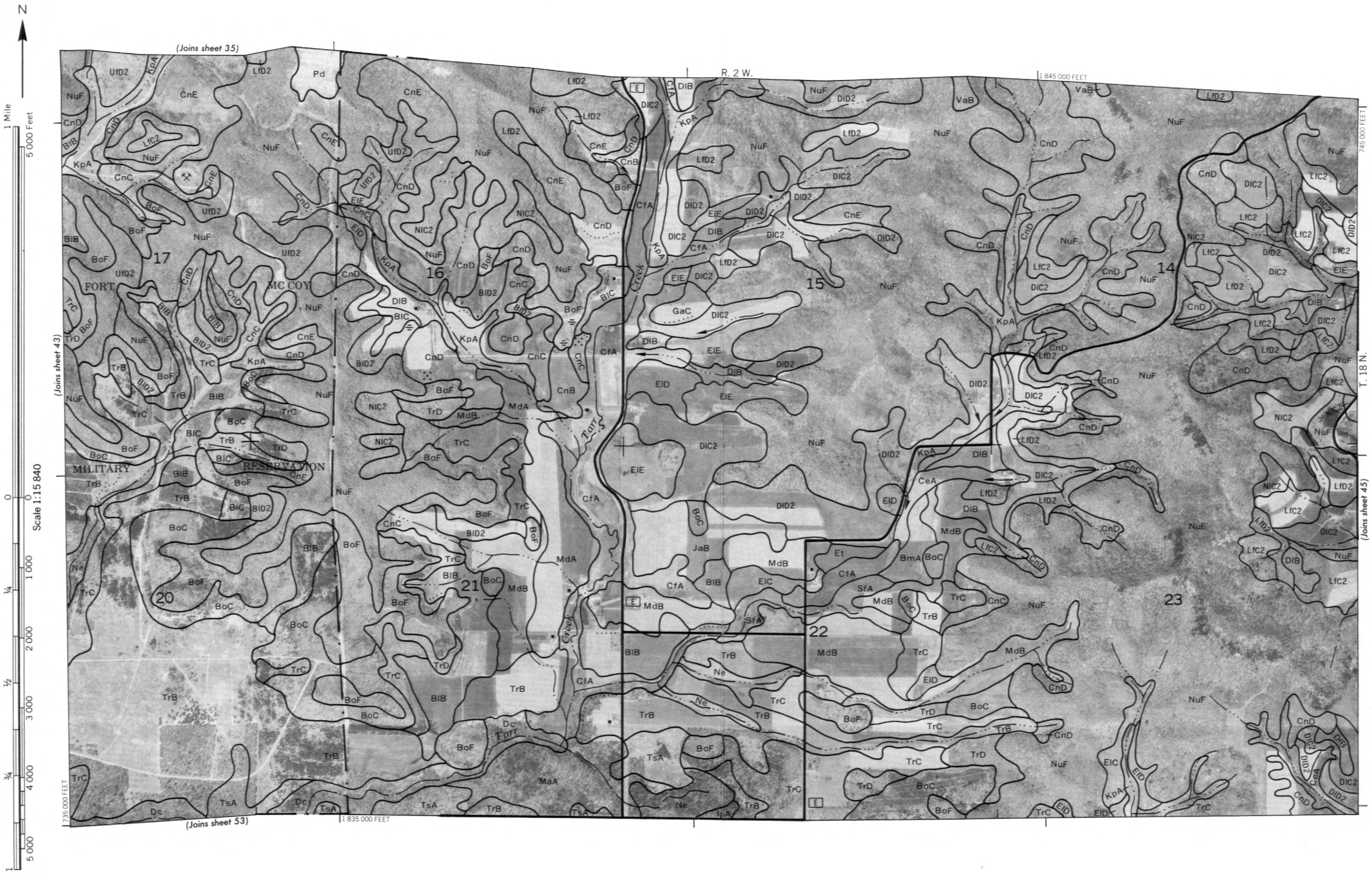

N
1 905 000 FEET
R. 1 E.
(Joins sheet 30)
T. 18 N.
750 000 FEET
(Joins sheet 38)
(Joins sheet 48)
JUNEAU COUNTY
Creek
Dandy
Beaver
Creek
745 000 FEET
1 920 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
½
¾
1
1 000
2 000
3 000
4 000
5 000


40
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 31)
(Joins sheet 49)
(Joins sheet 41)
R. 4 W.
T. 18 N.
LA CROSSE COUNTY
Wadels
Hill
1 760 000 FEET
1 775 000 FEET
740 000 FEET
745 000 FEET
16
17
18
19
20
21


N
(Joins sheet 32)
R. 4 W.
R. 3 W.
1 780 000 FEET
745 000 FEET
740 000 FEET
T. 18 N.
(Joins sheet 40)
(Joins sheet 42)
(Joins sheet 50)
1 790 000 FEET
Jenkins
Valley
15
14
13
18
22
23
24
19
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
½
¾
1 000
2 000
3 000
4 000
5 000

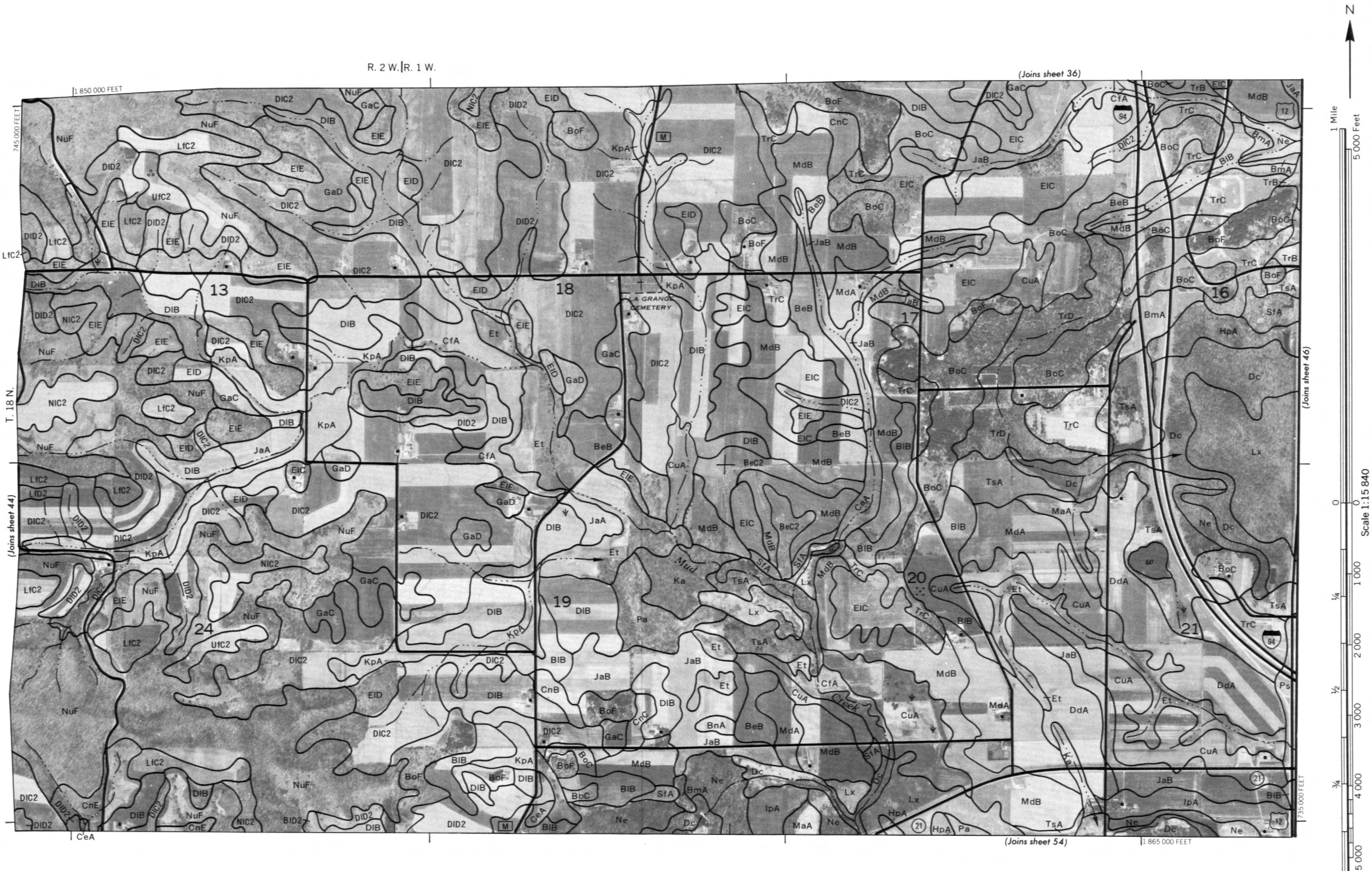

N
1 Mile
5 000 Feet
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
Scale 1:15 840
(Joins sheet 33)
R. 3 W.
1 810 000 FEET
745 000 FEET
(Joins sheet 41)
740 000 FEET
T. 18 N.
(Joins sheet 43)
1 795 000 FEET
(Joins sheet 51)
FORT MC COY MILITARY RESERVATION
La Crosse River
Bailey Creek
15
16
17
18
19
20
21
22


43
N
(Joins sheet 34)
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 52)
1 815 000 FEET
1 830 000 FEET
745 000 FEET
735 000 FEET
R. 3 W. | R. 2 W.
T. 18 N.
FORT
MC COY
MILITARY
RESERVATION
SANITARY
LANDFILL
La Crosse River
Squaw Creek
Squaw Lake
Tarr Creek
13
14
17
18
19
20
23
24
TrB
TrC
TrD
BoF
BoC
ImB
UfD2
Pd
NuF
BlC
BlB
CnD
KpA
MaA
IpA
Ne
TsA
Dc
1 Mile
5 000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
Scale 1:15 840


N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 35)
(Joins sheet 43)
(Joins sheet 45)
(Joins sheet 53)
R. 2 W.
T. 18 N.
1 845 000 FEET
745 000 FEET
735 000 FEET
1 835 000 FEET
FORT
MC COY
MILITARY
RESERVATION
Tarr Creek
17
16
15
14
20
21
22
23

MONROE COUNTY, WISCONSIN — SHEET NUMBER 45

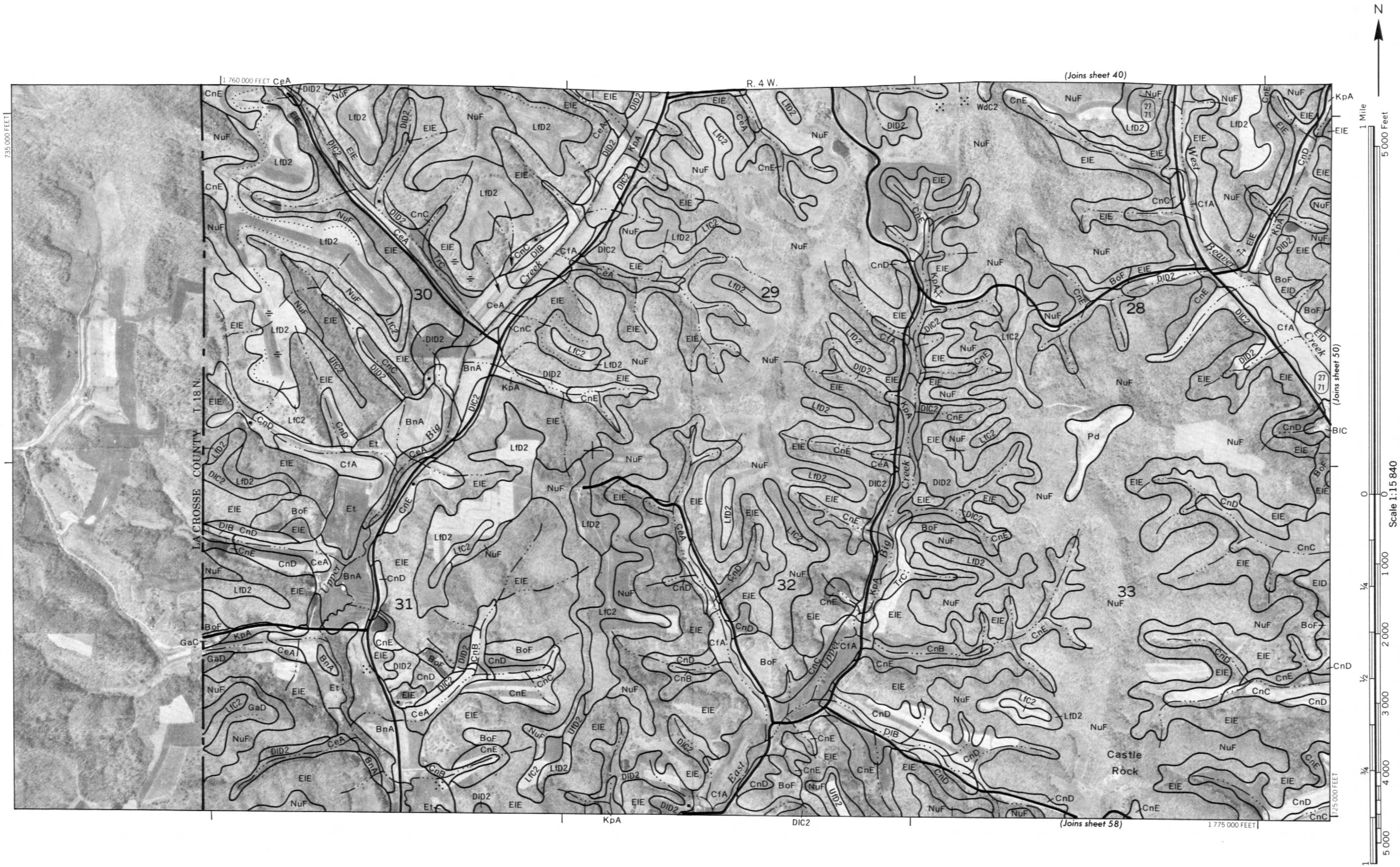
45

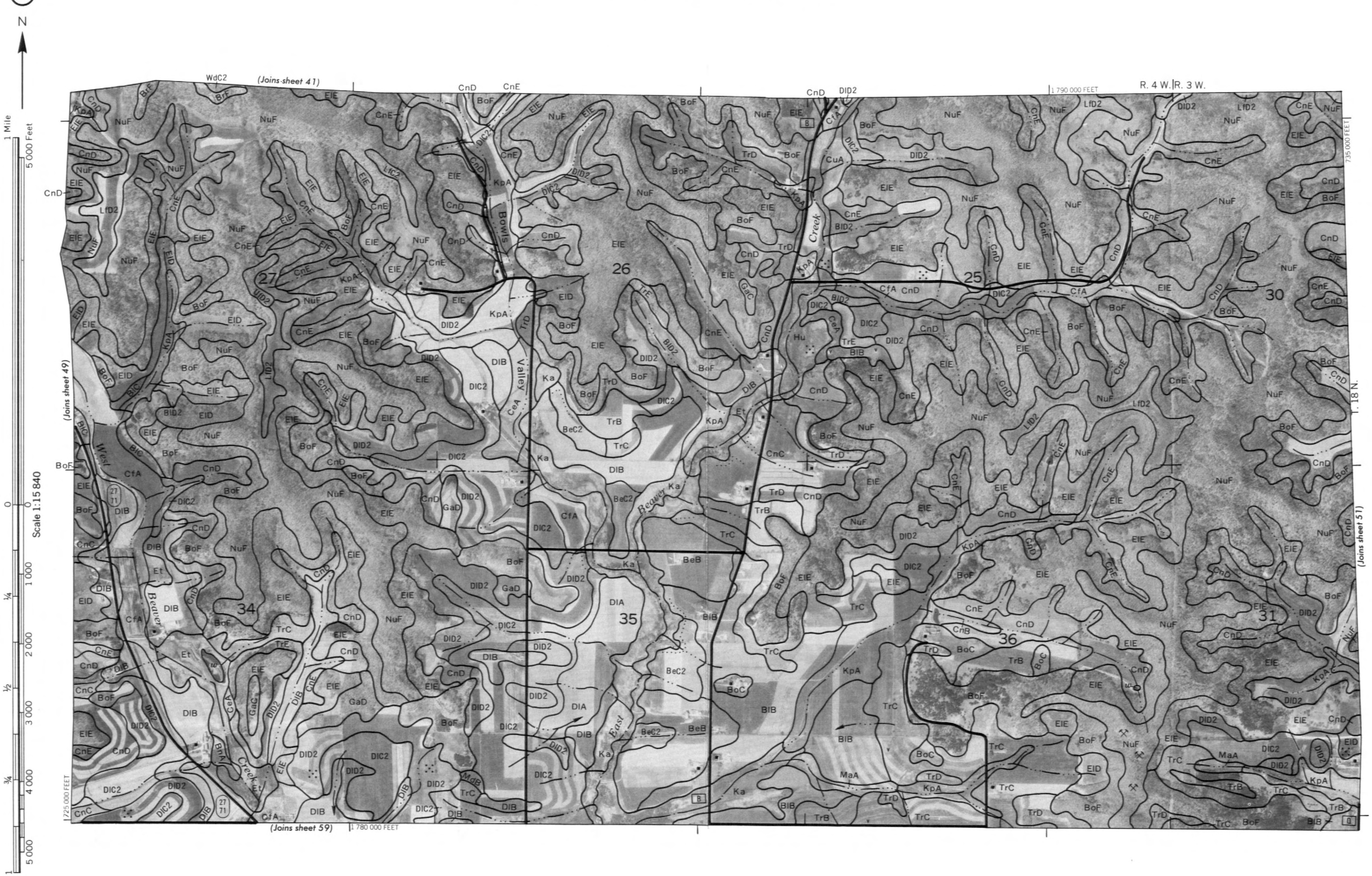


MONROE COUNTY, WISCONSIN — SHEET NUMBER 46


(Joins sheet 38)
R. 1 E.
1 890 000 FEET
745 000 FEET
T. 18 N.
(Joins sheet 46)
(Joins sheet 48)
(Joins sheet 56)
1 900 000 FEET
735 000 FEET
WOOD CEMETERY
SANITARY LANDFILL
Wyeville
Lemonweir River
East Fork
South Fork
CHICAGO AND NORTHWESTERN
15
16
17
18
19
20
21
22
173
21
N
1 Mile
5 000 Feet
Scale 1:15 840

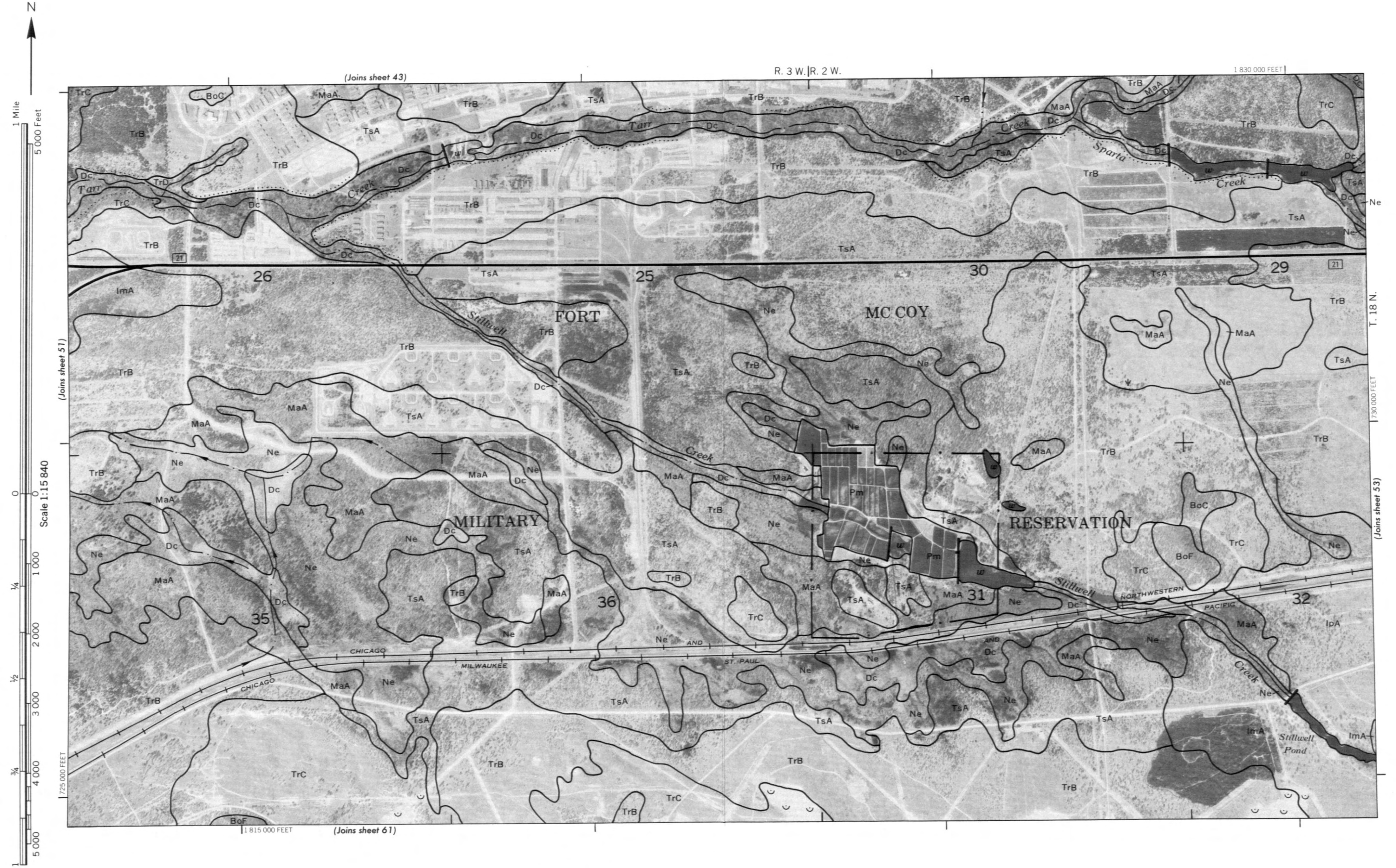

N
(Joins sheet 39)
(Joins sheet 47)
(Joins sheet 57)
R. 1 E.
T. 18 N.
1 920 000 FEET
740 000 FEET
735 000 FEET
1 905 000 FEET
15
14
13
22
23
24
Dandy Creek
Beaver Creek
LEMONWEIR RIVER
CHICAGO AND NORTHWESTERN
Shennington
JUNEAU COUNTY
ST. PETERS CEMETERY
water
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1

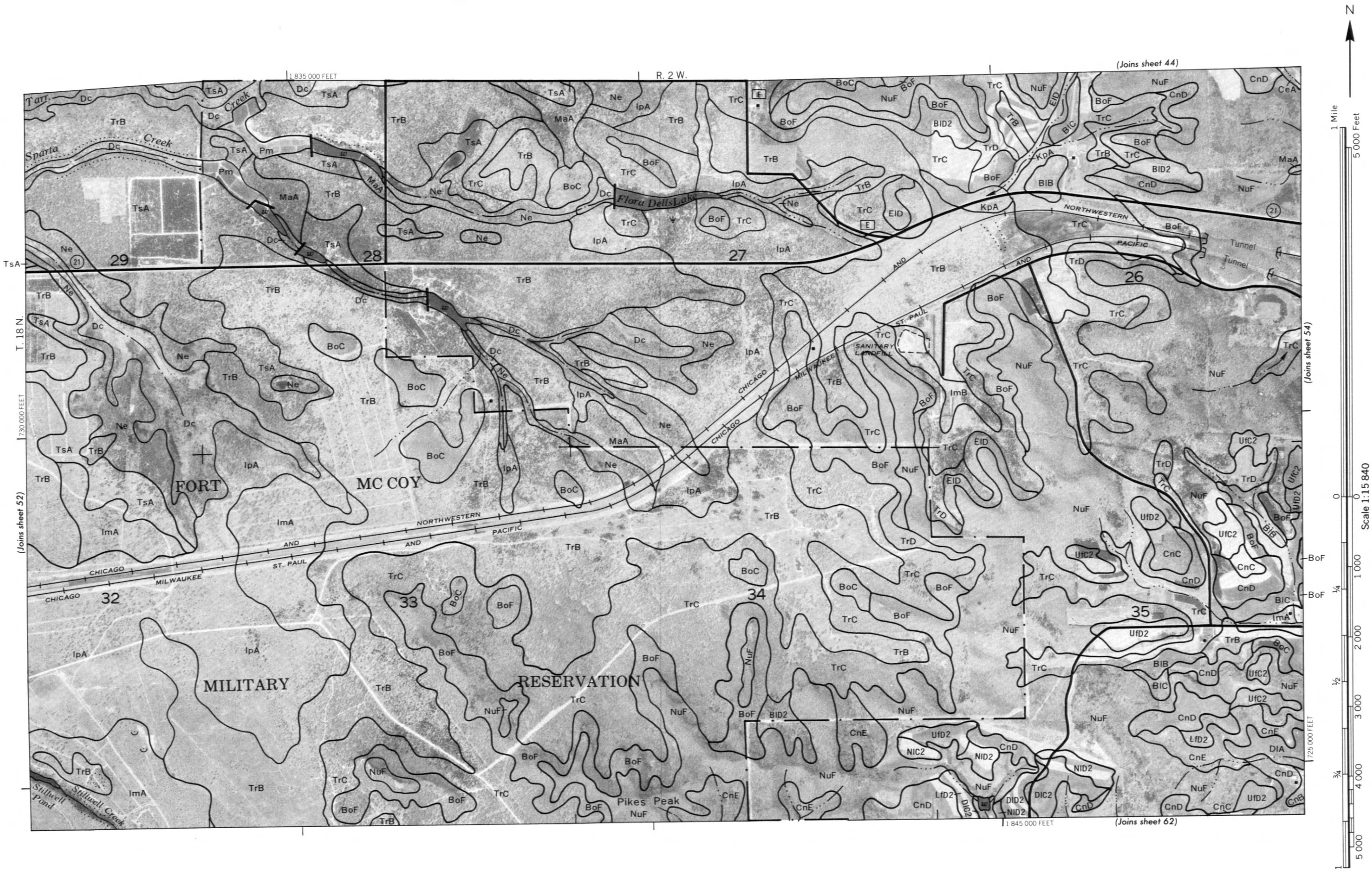

49
N
(Joins sheet 40)
R. 4 W.
1 760 000 FEET
735 000 FEET
LA CROSSE COUNTY
T. 18 N.
(Joins sheet 50)
(Joins sheet 58)
1 775 000 FEET
725 000 FEET
30
29
28
31
32
33
Big Creek
Upper Big Creek
East Upper Creek
West Beaver Creek
Castle Rock
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1


50
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 41)
(Joins sheet 49)
(Joins sheet 51)
(Joins sheet 59)
1 780 000 FEET
1 790 000 FEET
735 000 FEET
725 000 FEET
R. 4 W. | R. 3 W.
T. 18 N.
27
26
25
30
34
35
36
31
West
Beaver
Creek
Bowls
Valley
East

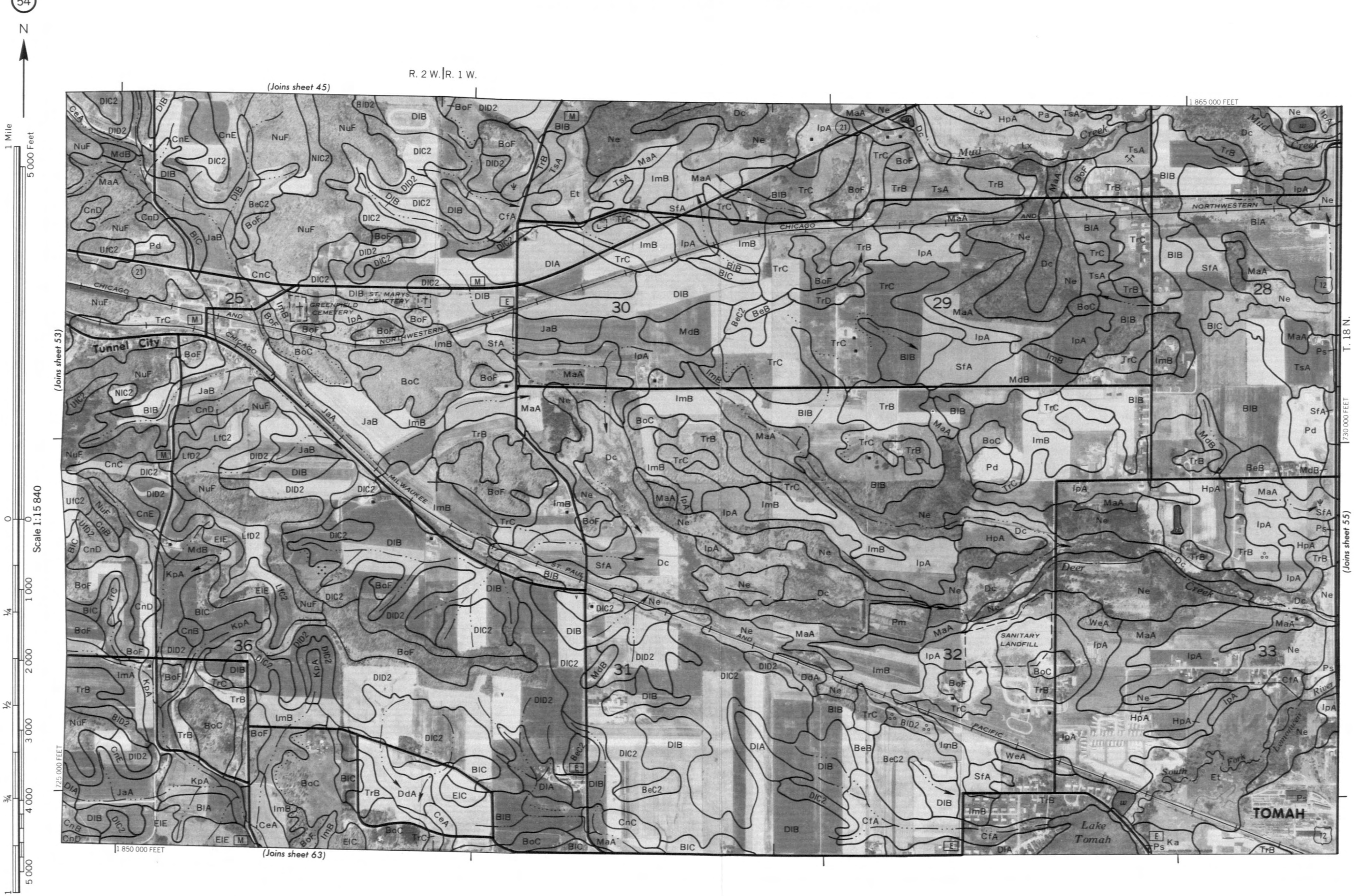

N
R. 3 W.
T. 18 N.
(Joins sheet 42)
(Joins sheet 50)
(Joins sheet 52)
(Joins sheet 60)
1 795 000 FEET
1 810 000 FEET
735 000 FEET
725 000 FEET
FORT MC COY
MILITARY RESERVATION
La Crosse River
Bailey Creek
Farr Creek
Ne River
27
28
29
30
31
32
33
34
Scale 1:15 840
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000

MONROE COUNTY, WISCONSIN — SHEET NUMBER 52



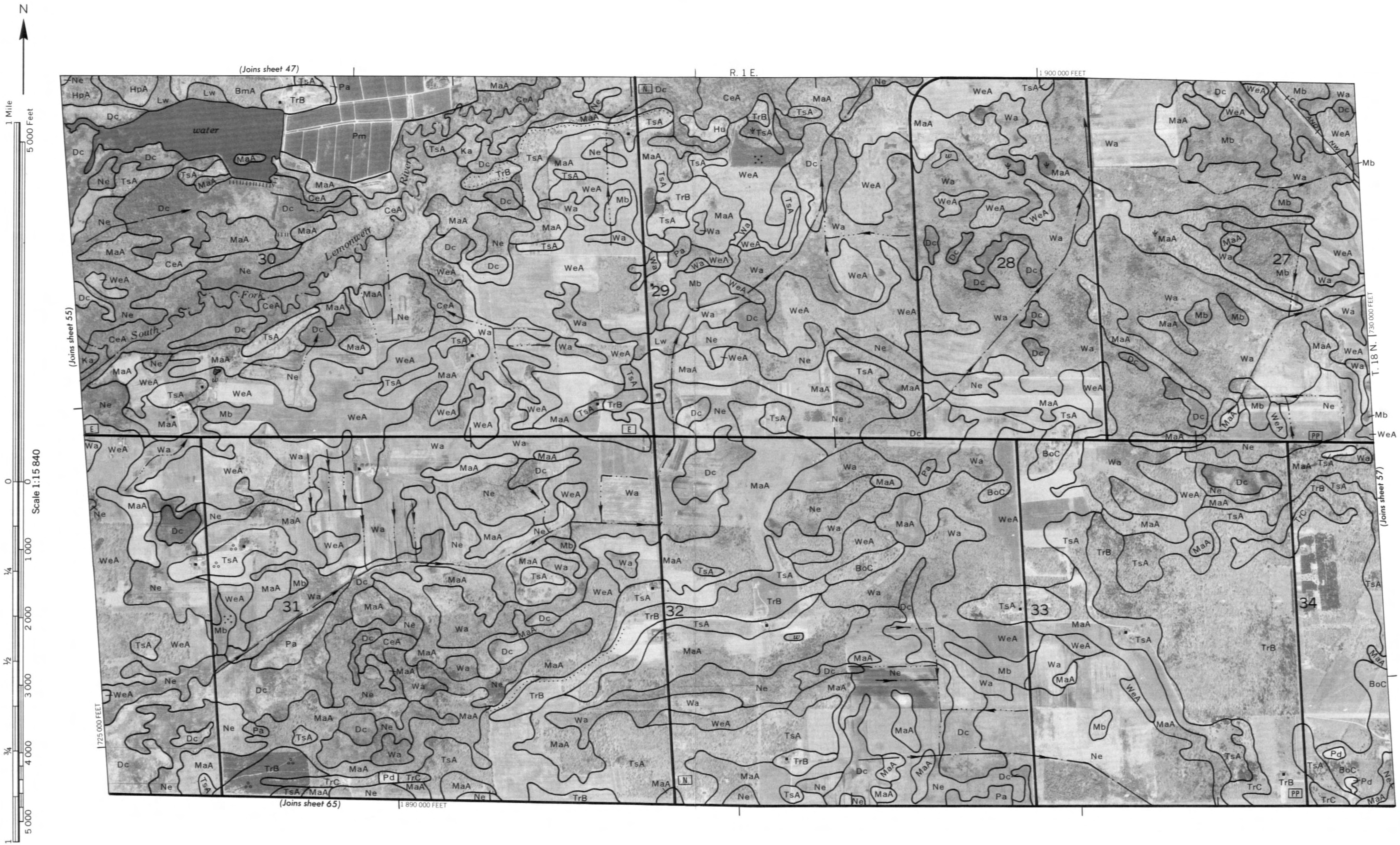

N
(Joins sheet 44)
(Joins sheet 52)
(Joins sheet 54)
(Joins sheet 62)
R. 2 W.
T. 18 N.
1 835 000 FEET
1 845 000 FEET
730 000 FEET
725 000 FEET
FORT
MC COY
MILITARY
RESERVATION
Flora Dells Lake
Sparta Creek
Tarr Creek
Stillwell Pond
Stillwell Creek
Pikes Peak
Tunnel
SANITARY LANDFILL
CHICAGO AND NORTHWESTERN
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
29
28
27
26
32
33
34
35
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000

MONROE COUNTY, WISCONSIN — SHEET NUMBER 54



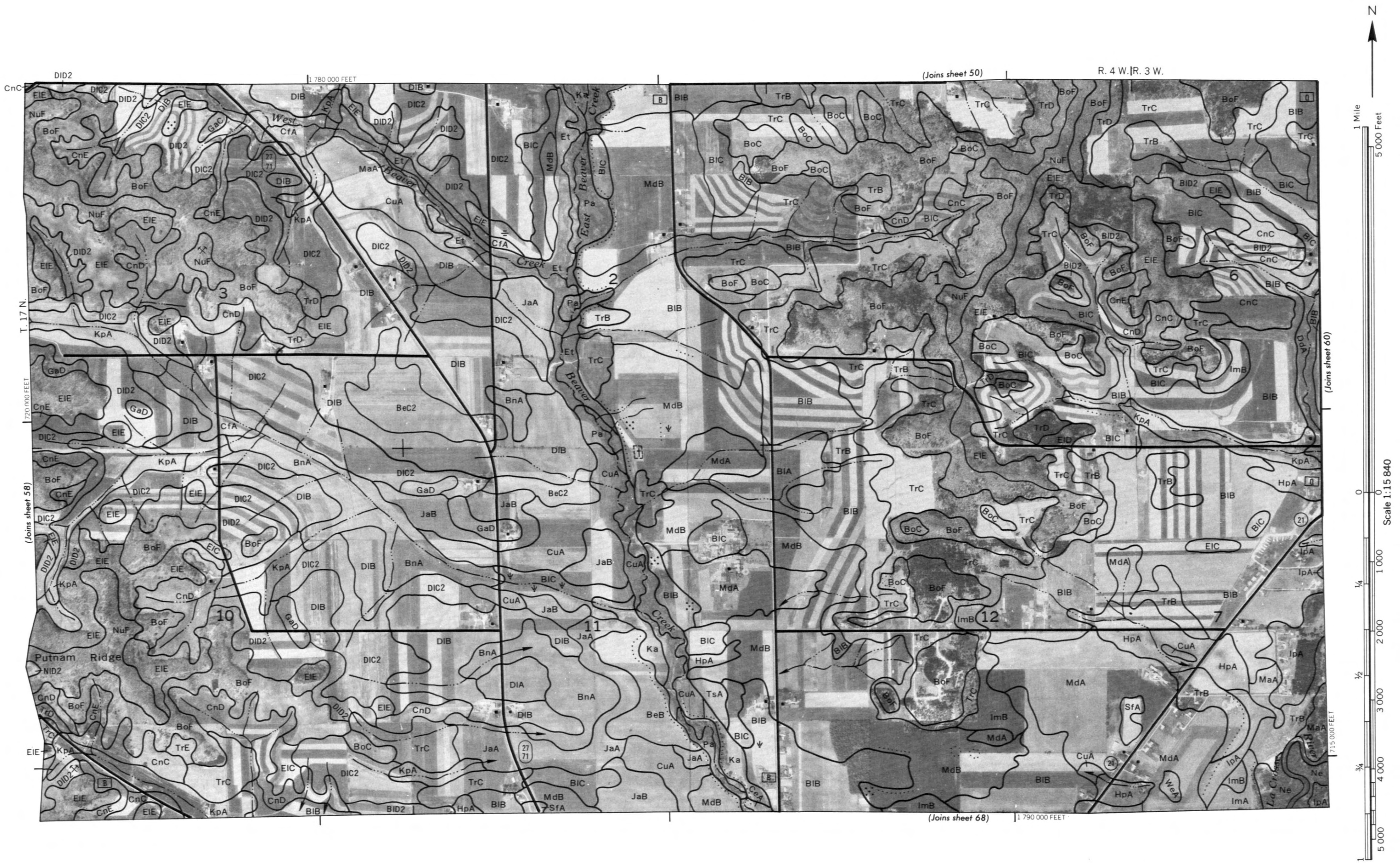

N
R. 1 W.
(Joins sheet 46)
(Joins sheet 54)
(Joins sheet 56)
(Joins sheet 64)
T. 18 N.
1 870 000 FEET
1 885 000 FEET
730 000 FEET
725 000 FEET
CHICAGO
AND
NORTHWESTERN
Mud
Creek
Lemonweir
River
South
Fork
Council
Creek
Deer
Creek
Kleyer
TOMAH
water
28
27
26
25
33
34
35
36
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000

MONROE COUNTY, WISCONSIN — SHEET NUMBER 56



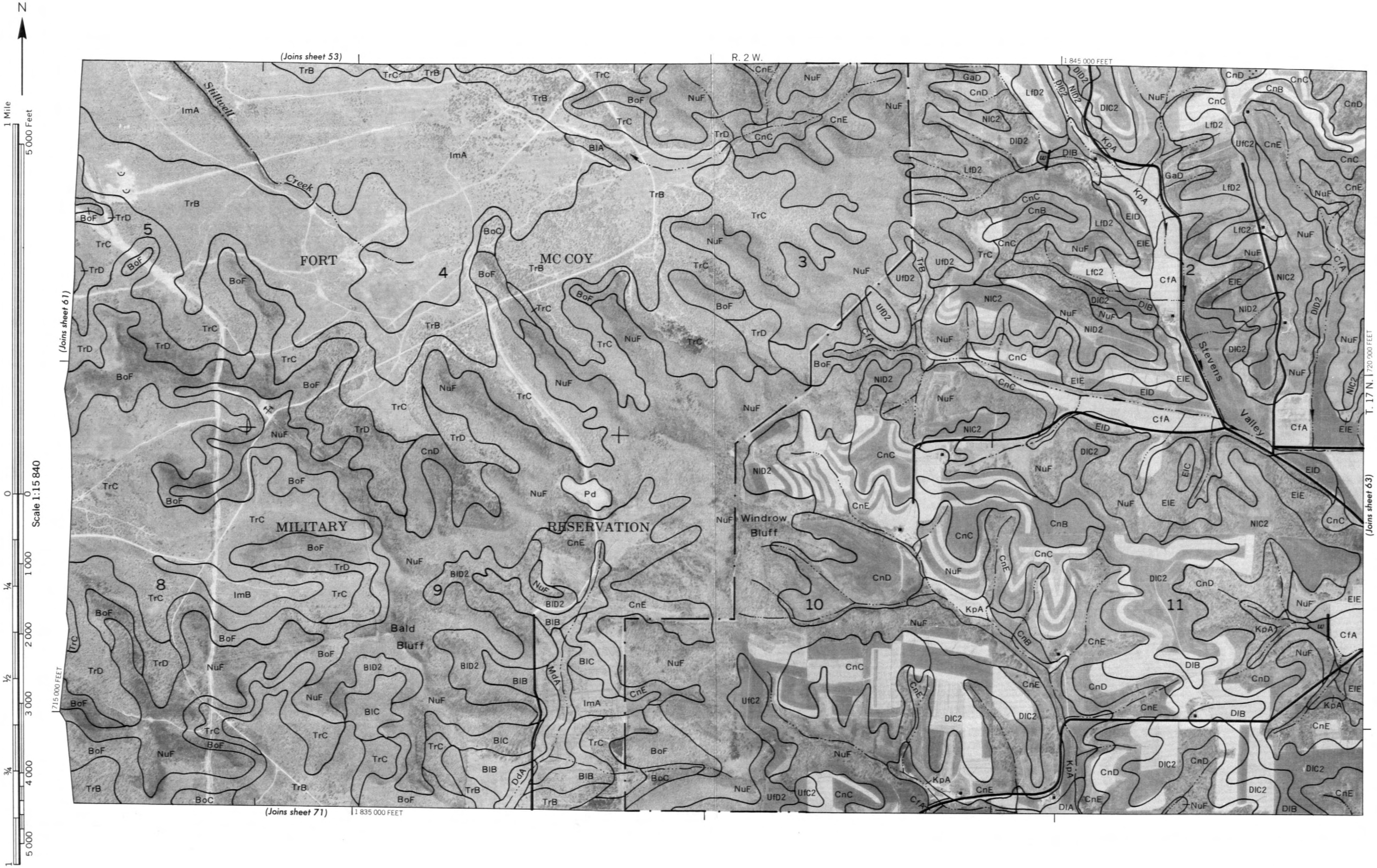
N
R. 1 E.
T. 18 N.
(Joins sheet 48)
(Joins sheet 56)
(Joins sheet 66)
LEMONWEIR RIVER
CHICAGO AND NORTHWESTERN
JUNEAU COUNTY
1 905 000 FEET
1 920 000 FEET
730 000 FEET
725 000 FEET
27
26
25
34
35
36
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
½
¾
1
1 000
2 000
3 000
4 000
5 000


N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 49)
R. 4 W.
1 775 000 FEET
T. 17 N.
720 000 FEET
(Joins sheet 59)
(Joins sheet 67)
1 760 000 FEET
715 000 FEET
LA CROSSE COUNTY
Upper Big Creek
East Big Creek
Big Creek
Putnam Ridge
5
4
6
7
8
9

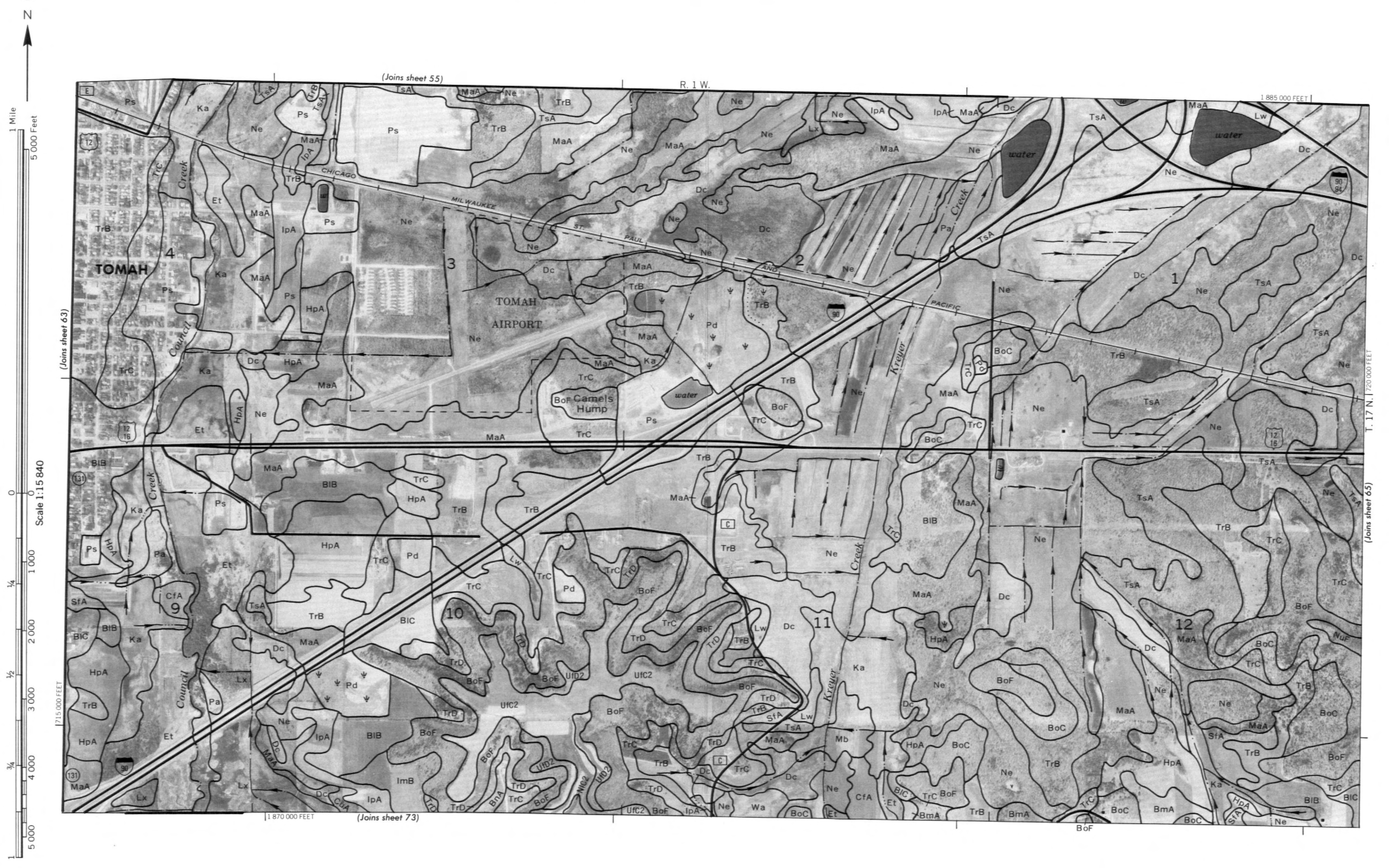

N
(Joins sheet 50)
R. 4 W. | R. 3 W.
1 780 000 FEET
T. 17 N.
720 000 FEET
(Joins sheet 58)
(Joins sheet 60)
(Joins sheet 68)
1 790 000 FEET
715 000 FEET
West Beaver Creek
East Beaver Creek
Beaver Creek
La Crosse River
Putnam Ridge
1 Mile
5 000 Feet
Scale 1:15 840


N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 51)
R. 3 W.
1 810 000 FEET
T. 17 N.
720 000 FEET
(Joins sheet 61)
(Joins sheet 59)
(Joins sheet 69)
1 795 000 FEET
715 000 FEET
ANGELO CEMETERY
Angelo
Angelo Pond
La Crosse River
LA CROSSE RIVER
Silver Creek
Swamp Lake Creek
Creek
SPARTA AIRPORT
FORT MC COY MILITARY RESERVATION
Lower Pass
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
CHICAGO AND NORTHWESTERN
21
3
4
5
6
7
8
9
10
BlB
BlA
BlC
BoC
BoF
DdA
Dc
ElC
HpA
IpA
KpA
MaA
Ne
NuF
Pd
SfA
TrB
TrC
TsA


61
N
1 815 000 FEET
R. 3 W. | R. 2 W.
(Joins sheet 52)
(Joins sheet 60)
(Joins sheet 62)
(Joins sheet 70)
T. 17 N.
720 000 FEET
715 000 FEET
1 830 000 FEET
Selfridge Knoll
Hill "H"
Upper Pass
FORT
Lafayette Pass
MC COY
Raymore Pass
Quarry Hill
MILITARY
RESERVATION
Thorp Hill
Perry Peak
Scotts Junction
Stevens Knoll
Swamp Creek
1
2
5
6
7
8
11
12
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000


N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
(Joins sheet 53)
R. 2 W.
1 845 000 FEET
(Joins sheet 61)
(Joins sheet 63)
(Joins sheet 71)
1 835 000 FEET
715 000 FEET
720 000 FEET
T. 17 N.
FORT
MC COY
MILITARY
RESERVATION
Stillwell
Creek
Windrow
Bluff
Bald
Bluff
Stevens
Valley
2
3
4
5
8
9
10
11
ImA
TrB
TrC
TrD
BoF
BoC
BlA
NuF
CnE
CnC
CnD
CnB
GaD
LfD2
DlD2
DlC2
NlC2
NlD2
DlB
KpA
ElD
ElE
ElC
LfC2
UfC2
UfD2
CfA
Pd
ImB
BlD2
BlB
BlC
MdA
DdA
DlA

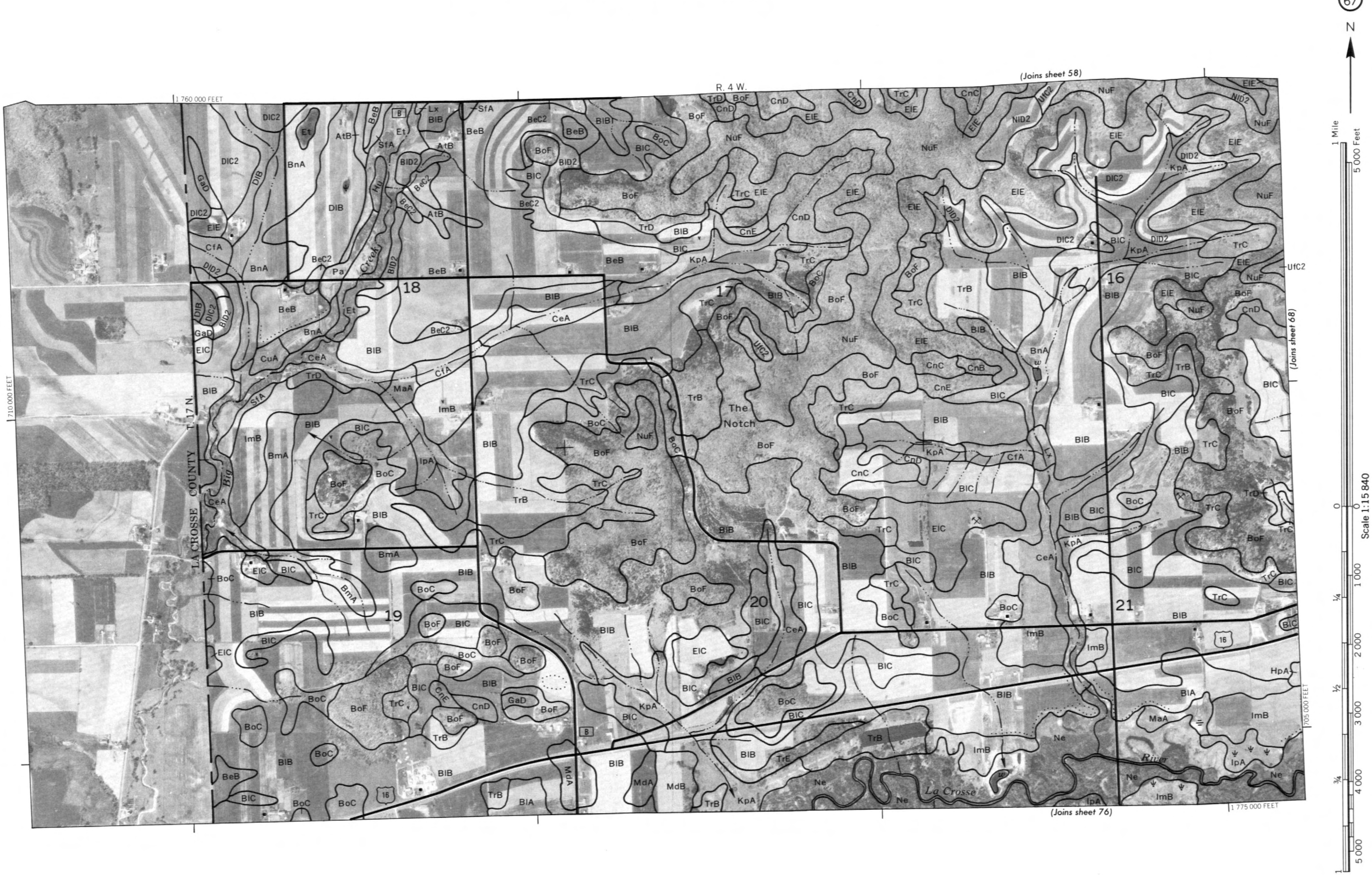

N
R. 2 W. | R. 1 W.
1 850 000 FEET
1 865 000 FEET
720 000 FEET
715 000 FEET
T. 17 N.
(Joins sheet 54)
(Joins sheet 72)
(Joins sheet 62)
(Joins sheet 64)
Lake Tomah
TOMAH
Stevens Valley
Lemonweir River
South Fork
OAK GROVE CEMETERY
1 Mile
5 000 Feet
Scale 1:15 840


64
N
(Joins sheet 55)
R. 1 W.
1 885 000 FEET
(Joins sheet 63)
(Joins sheet 65)
(Joins sheet 73)
1 870 000 FEET
715 000 FEET
720 000 FEET
T. 17 N.
TOMAH
TOMAH AIRPORT
Camels Hump
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
Council Creek
Kreyer Creek
water
Scale 1:15 840
1 Mile
5 000 Feet

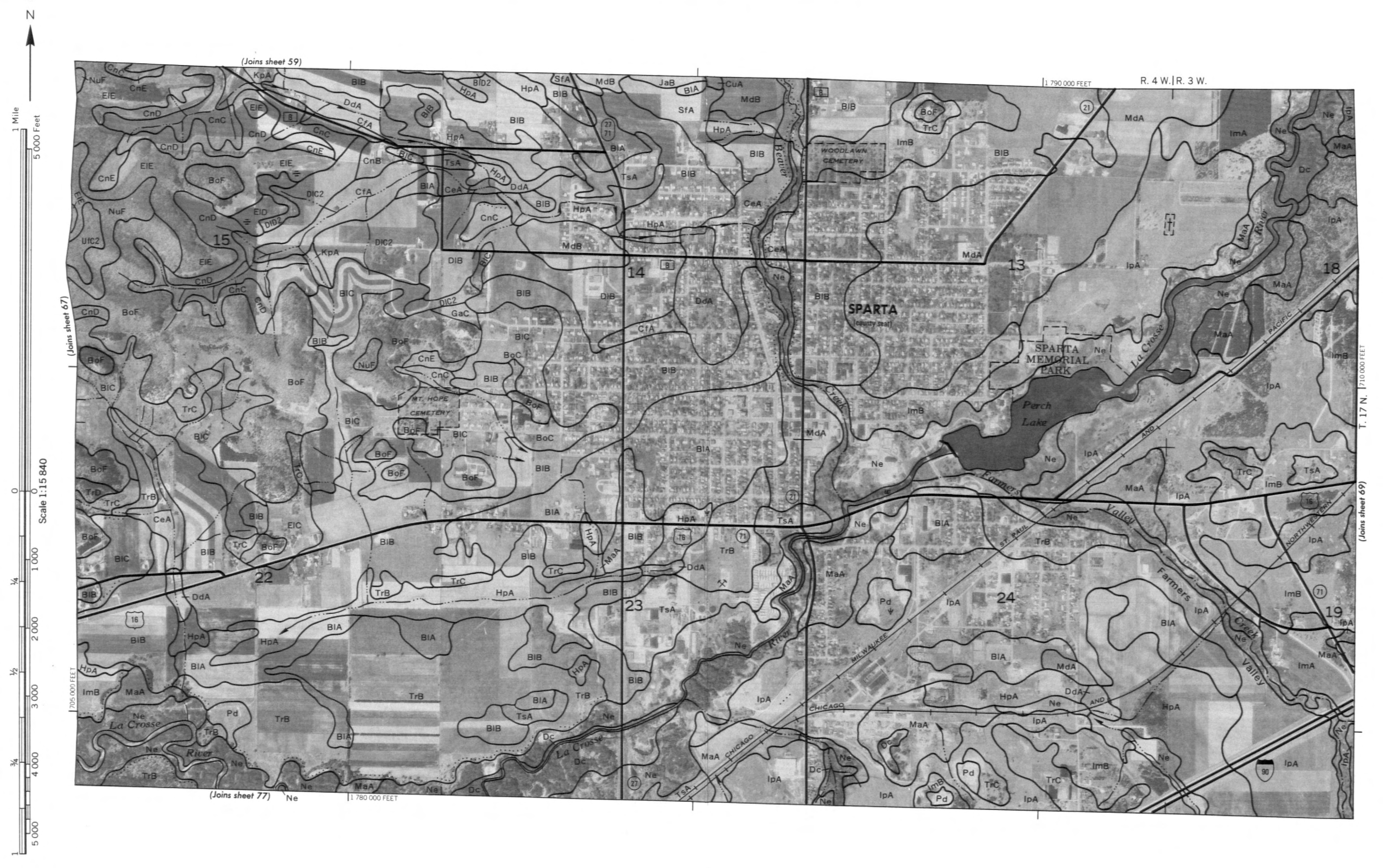

N
(Joins sheet 56)
(Joins sheet 64)
(Joins sheet 66)
(Joins sheet 74)
R. 1 E.
T. 17 N.
1 890 000 FEET
1 900 000 FEET
720 000 FEET
715 000 FEET
Stone Bluff
Bear Creek
Indian Creek
Allen Creek
Oakdale
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
water
3
4
5
6
7
8
9
10
Scale 1:15 840
1 Mile
5 000 Feet


N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1
(Joins sheet 57)
(Joins sheet 65)
(Joins sheet 75)
R. 1 E.
T. 17 N.
1 920 000 FEET
720 000 FEET
715 000 FEET
1 905 000 FEET
Bear Creek
Wa Creek
Allen Creek
CHICAGO AND NORTHWESTERN
JUNEAU COUNTY
Wildcat Bluff
MILL BLUFF STATE PARK
Bear Bluff
Camels Bluff
Devils Monument
90 94

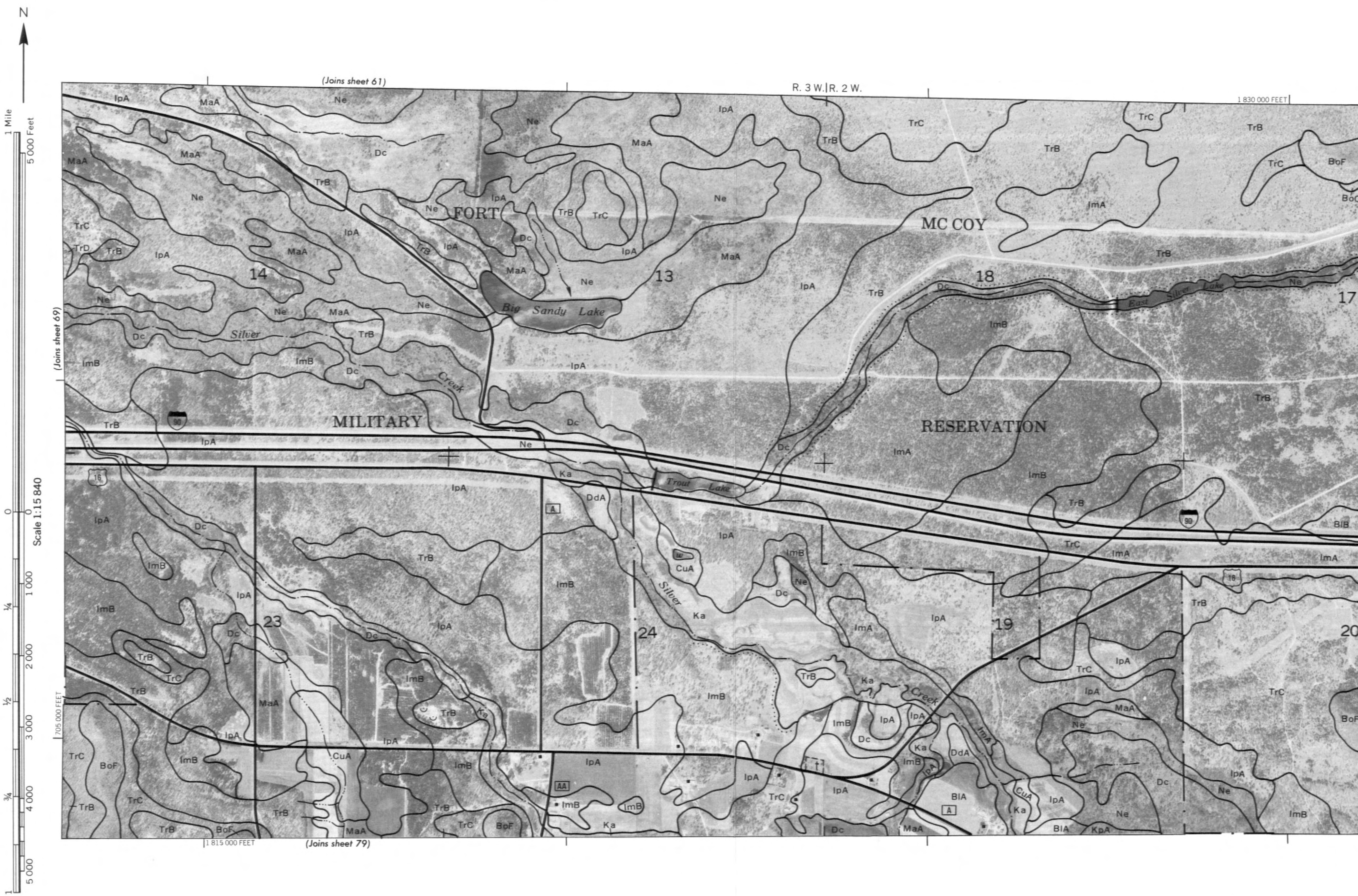
MONROE COUNTY, WISCONSIN — SHEET NUMBER 67

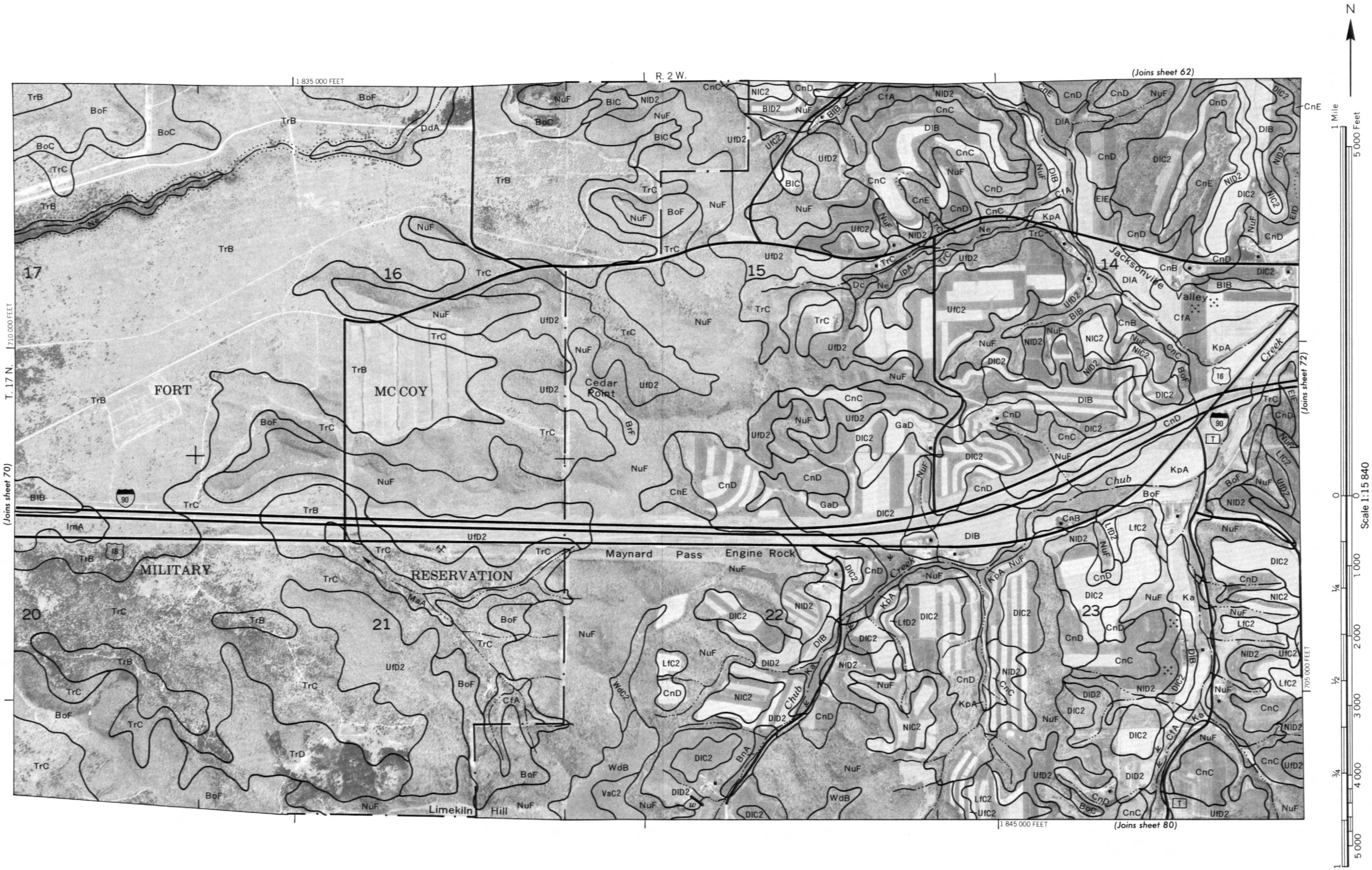


MONROE COUNTY, WISCONSIN — SHEET NUMBER 68




69
N
R. 3 W.
(Joins sheet 60)
(Joins sheet 68)
(Joins sheet 70)
(Joins sheet 78)
T. 17 N.
1 795 000 FEET
1 810 000 FEET
710 000 FEET
705 000 FEET
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
CHICAGO AND NORTHWESTERN
FORT
MC COY
MILITARY
RESERVATION
West Sandy Lake
Sandy Lake
Silver
Creek
18
17
16
15
19
20
21
22
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾


N
(Joins sheet 61)
R. 3 W. | R. 2 W.
1 830 000 FEET
(Joins sheet 69)
(Joins sheet 71)
T. 17 N.
710 000 FEET
705 000 FEET
1 815 000 FEET
(Joins sheet 79)
FORT
MC COY
MILITARY
RESERVATION
Big Sandy Lake
Silver Creek
Trout Lake
East Silver Lake
13
14
17
18
19
20
23
24
Scale 1:15 840
1 Mile
5 000 Feet
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾

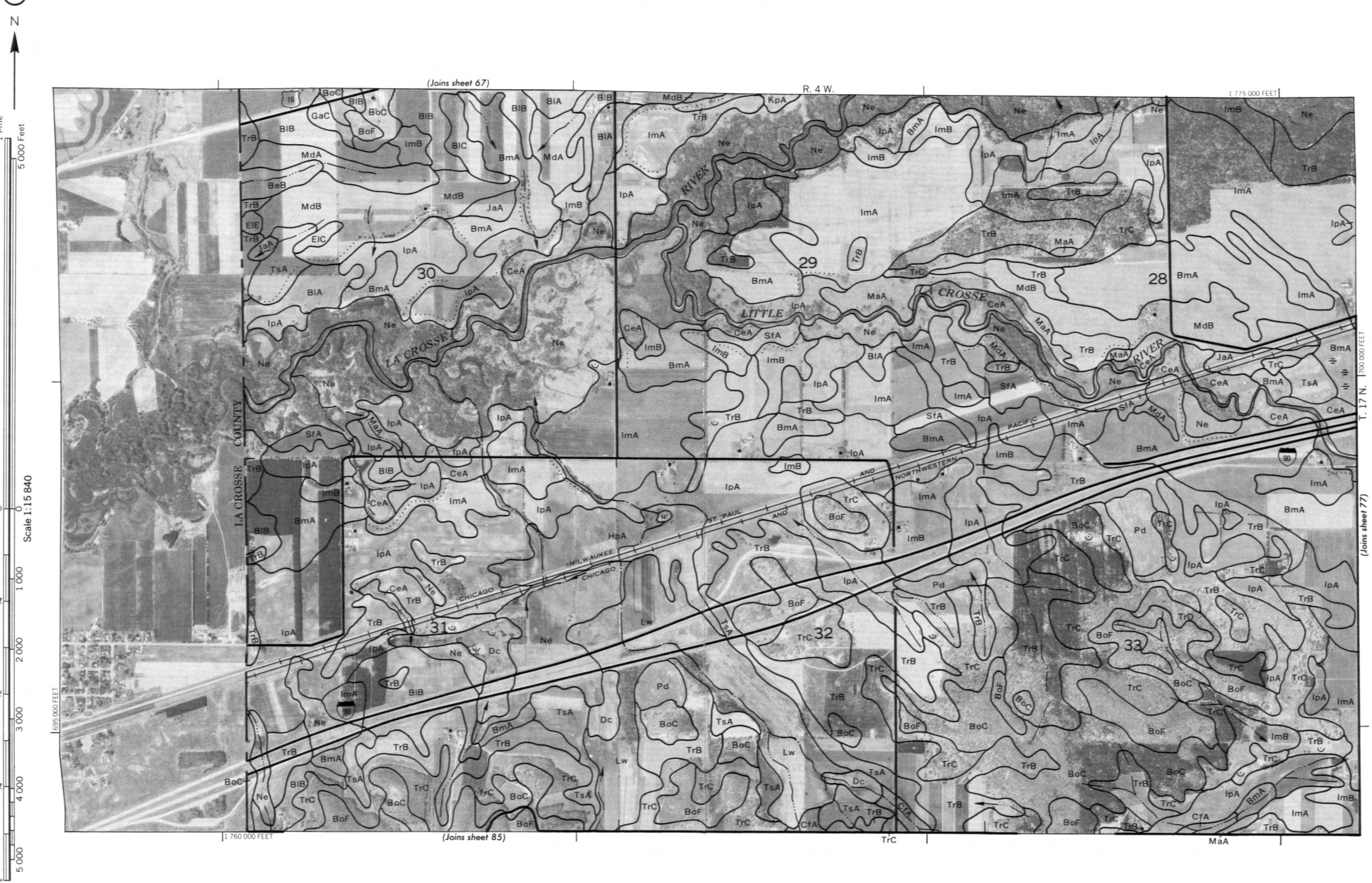

71
N
(Joins sheet 62)
(Joins sheet 70)
(Joins sheet 72)
(Joins sheet 80)
R. 2 W.
T. 17 N.
1 835 000 FEET
1 845 000 FEET
710 000 FEET
705 000 FEET
FORT
MC COY
MILITARY
RESERVATION
Cedar Point
Maynard Pass
Engine Rock
Limekiln Hill
Jacksonville Valley
Chub Creek
17
16
15
14
20
21
22
23
90
16
Scale 1:15 840
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000


N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 63)
R. 2 W. | R. 1 W.
1 865 000 FEET
(Joins sheet 71)
(Joins sheet 73)
(Joins sheet 81)
1 850 000 FEET
710 000 FEET
705 000 FEET
T. 17 N.
Jacksonville
Valley
Chub
Creek
Lemonweir
River
South
Fork
Reels
Valley
MT. VERNON CEMETERY
13
18
17
16
24
19
20
21

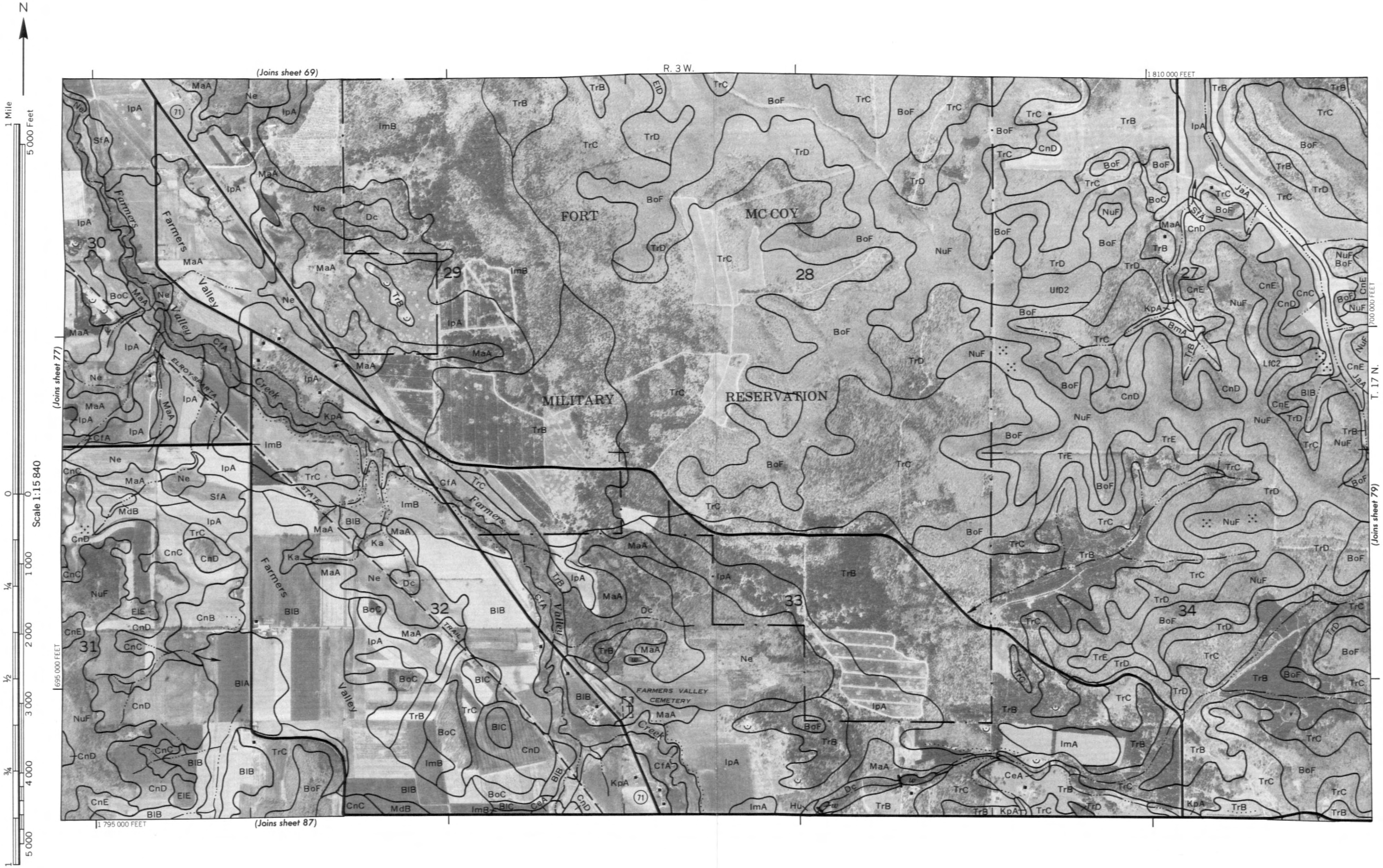

73
N
R. 1 W.
T. 17 N.
1 870 000 FEET
1 885 000 FEET
710 000 FEET
705 000 FEET
(Joins sheet 64)
(Joins sheet 72)
(Joins sheet 74)
(Joins sheet 82)
Council Creek
Kreyer Creek
13
14
15
16
21
22
23
24
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾


N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 65)
(Joins sheet 73)
(Joins sheet 75)
(Joins sheet 83)
R. 1 E.
T. 17 N.
1 900 000 FEET
1 890 000 FEET
710 000 FEET
705 000 FEET
15
16
17
18
19
20
21
22
Bear Creek
Indian Creek
Allen Creek
Diamond Valley
OAKDALE CEMETERY


(Joins sheet 66)
(Joins sheet 74)
(Joins sheet 84)
R. 1 E.
T. 17 N.
1 905 000 FEET
710 000 FEET
705 000 FEET
1 920 000 FEET
MILL BLUFF STATE PARK
Bee Bluff
Round Bluff
Diamond Valley
SORENSON CEMETERY
JUNEAU COUNTY
water
N
Scale 1:15 840
1 Mile
5 000 Feet


N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 67)
R. 4 W.
1 775 000 FEET
700 000 FEET
T. 17 N.
(Joins sheet 77)
695 000 FEET
1 760 000 FEET
(Joins sheet 85)
LA CROSSE COUNTY
LITTLE LA CROSSE RIVER
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
CHICAGO AND NORTHWESTERN
90
16
28
29
30
31
32
33


N
(Joins sheet 68)
R. 4 W. | R. 3 W.
1 780 000 FEET
700 000 FEET
T. 17 N.
(Joins sheet 76)
(Joins sheet 78)
(Joins sheet 86)
1 790 000 FEET
695 000 FEET
SPARTA CEMETERY
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
CHICAGO AND NORTHWESTERN
La Crosse River
LITTLE LA CROSSE RIVER
Leon Valley
Farmers Valley
27
26
25
30
34
35
36
31
Scale 1:15 840
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000

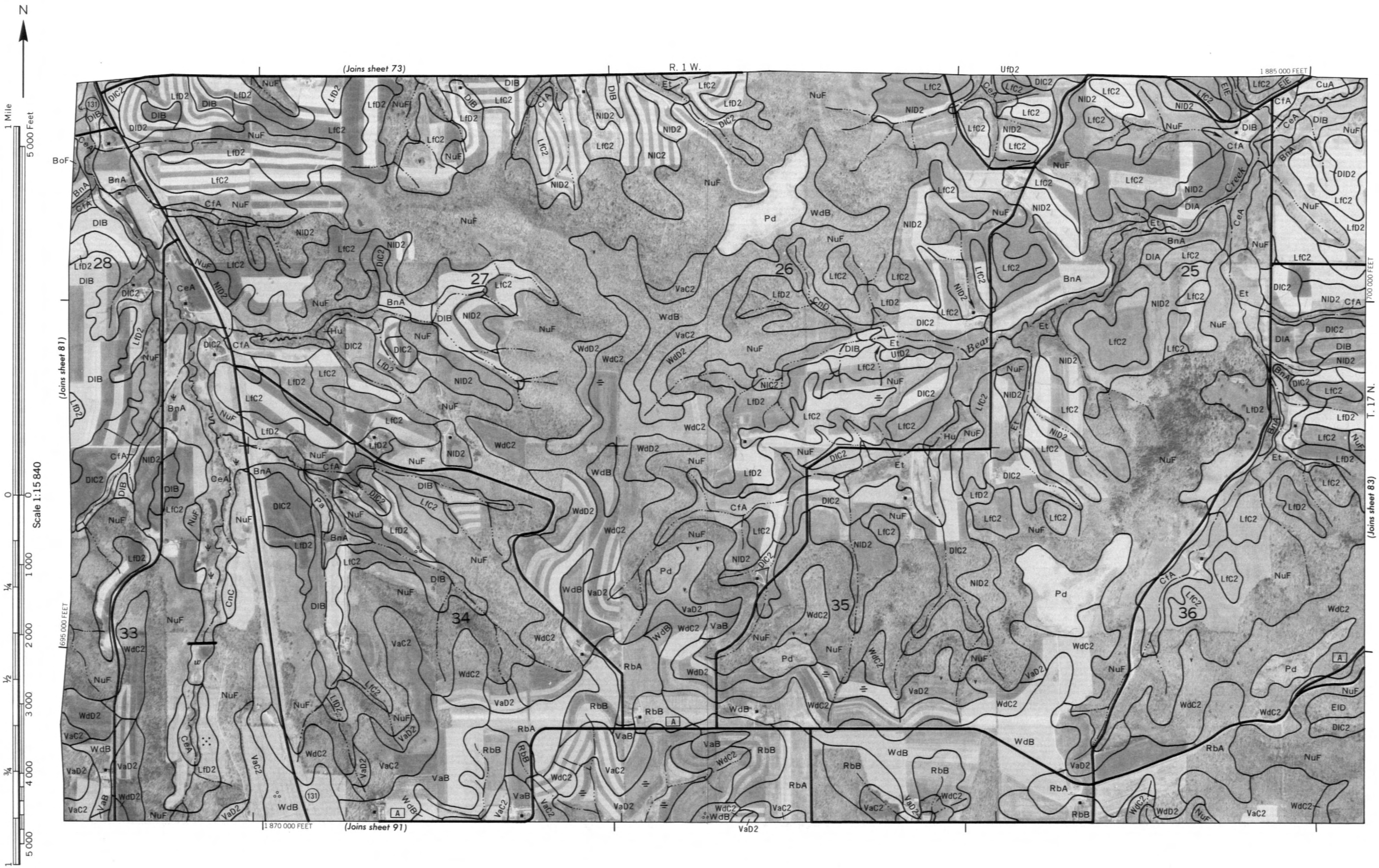

N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 69)
R. 3 W.
1 810 000 FEET
(Joins sheet 77)
(Joins sheet 79)
(Joins sheet 87)
T. 17 N.
700 000 FEET
695 000 FEET
1 795 000 FEET
FORT MC COY
MILITARY RESERVATION
FARMERS VALLEY CEMETERY
Farmers Valley Creek
ELROY-SPARTA STATE TRAIL
29
28
27
30
31
32
33
34


N
R. 3 W. | R. 2 W.
(Joins sheet 70)
(Joins sheet 78)
(Joins sheet 80)
(Joins sheet 88)
1 815 000 FEET
1 830 000 FEET
700 000 FEET
695 000 FEET
T. 17 N.
FORT MC COY MILITARY RESERVATION
Silver Creek
Coles Valley
Cave Rock
Chicken Rock
Face Rock
25
26
29
30
31
32
35
36
Scale 1:15 840
1 Mile
5 000 Feet
0
¼
½
¾
1 000
2 000
3 000
4 000
5 000


80
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 71)
(Joins sheet 79)
(Joins sheet 81)
(Joins sheet 89)
R. 2 W.
T. 17 N.
1 845 000 FEET
1 835 000 FEET
700 000 FEET
695 000 FEET
FORT MC COY MILITARY RESERVATION
Coles Peak
Silver
Coles Valley Creek
COLES VALLEY CEMETERY
29
28
27
26
32
33
34
35


N
R. 2 W. | R. 1 W.
T. 17 N.
1 850 000 FEET
700 000 FEET
695 000 FEET
1 865 000 FEET
(Joins sheet 72)
(Joins sheet 80)
(Joins sheet 82)
(Joins sheet 90)
25
29
30
28
31
32
33
36
South Fork Lemonweir River
Reels Valley
Linnehan Valley
Council Creek
Scale 1:15 840
1 Mile
5 000 Feet

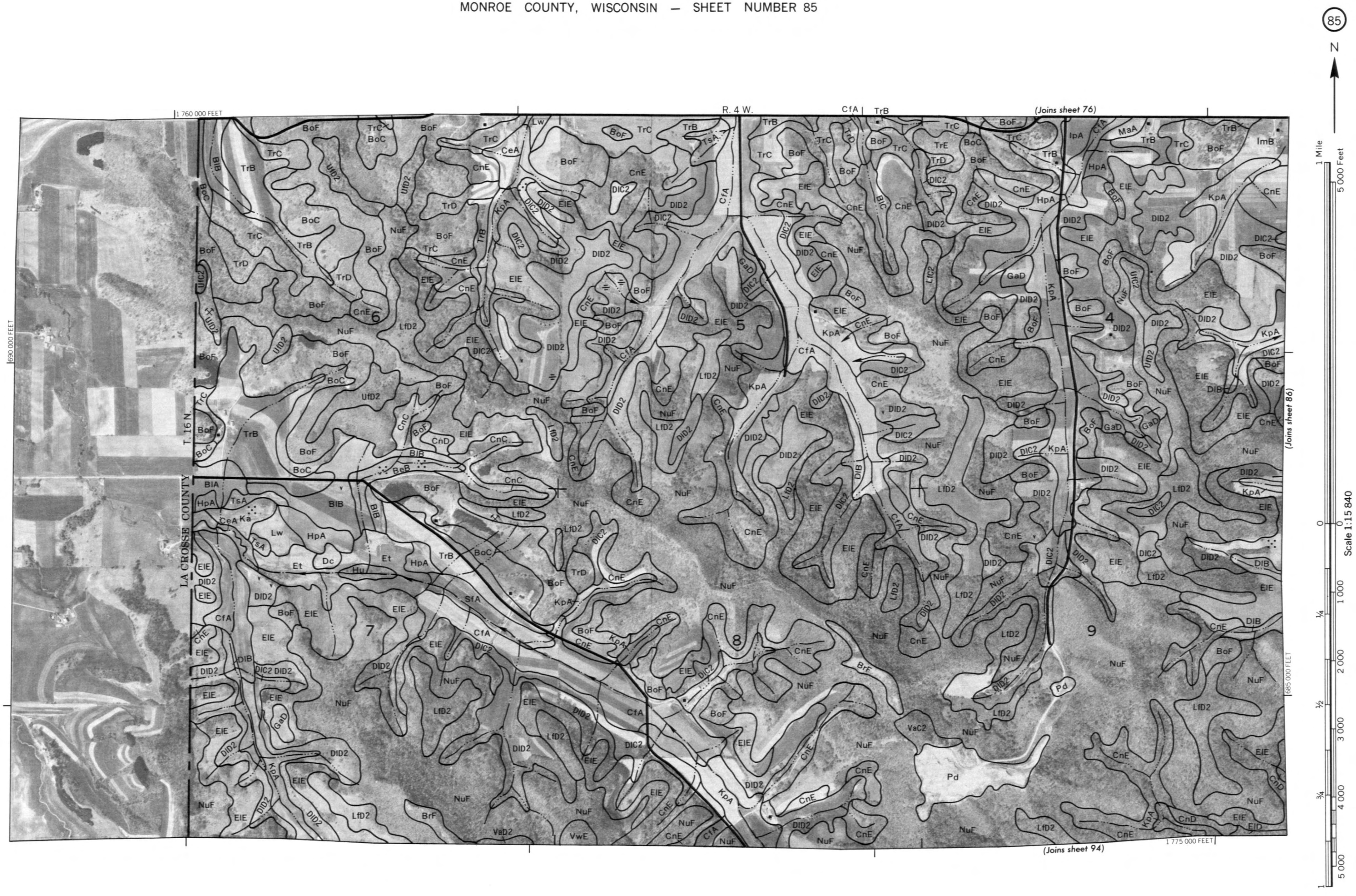
MONROE COUNTY, WISCONSIN — SHEET NUMBER 82




N
(Joins sheet 74)
(Joins sheet 84)
(Joins sheet 92)
(Joins sheet 82)
R. 1 E.
T. 17 N.
1 890 000 FEET
1 900 000 FEET
700 000 FEET
695 000 FEET
Indian Ridge
Indian Creek
ST. MICHAELS CEMETERY
St. Michaels Church
27
28
29
30
31
32
33
34
Scale 1:15 840
1 Mile
5 000 Feet

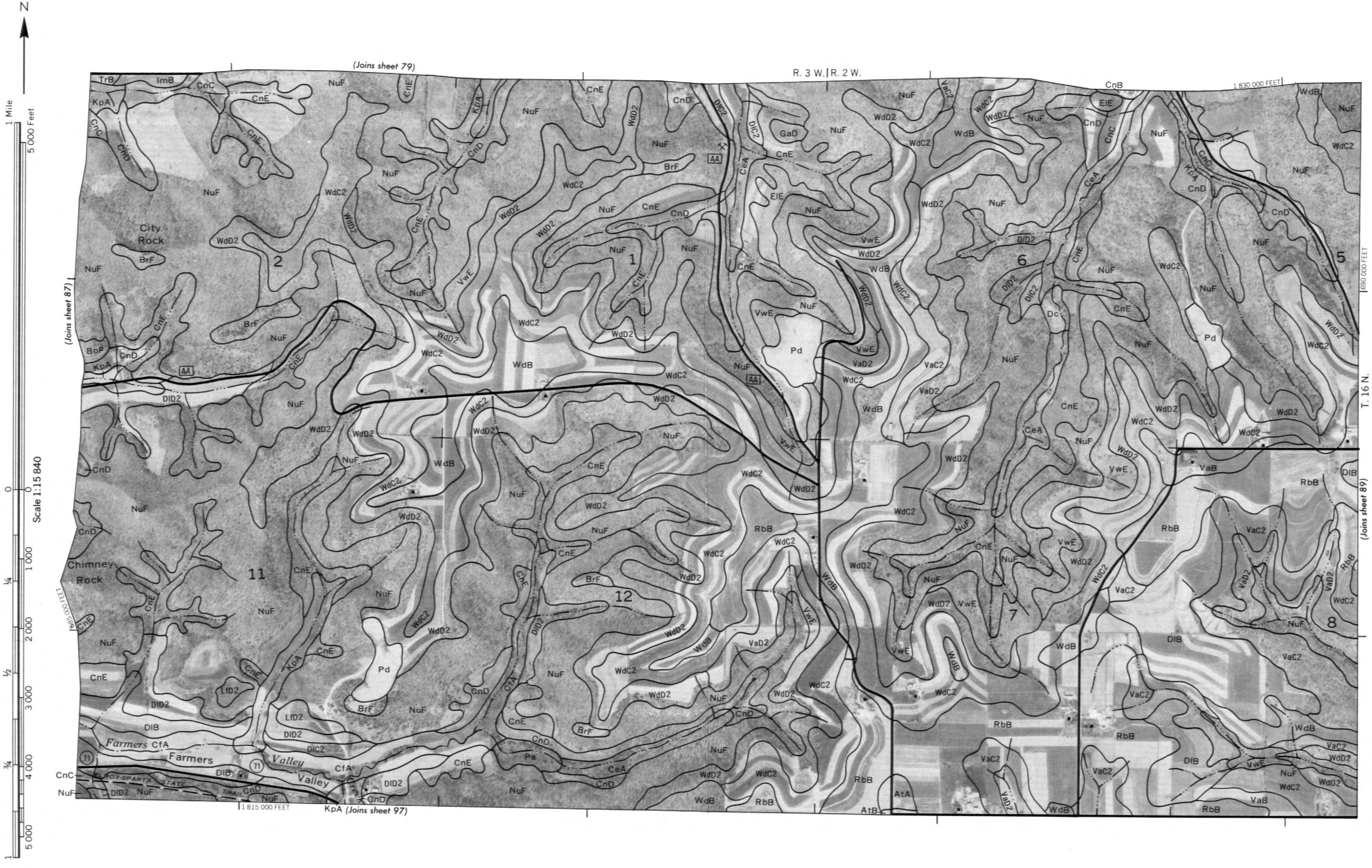
N

1 Mile
5 000 Feet
Scale 1:15 840
0 1 000 2 000 3 000 4 000 5 000
0 ¼ ½ ¾ 1


85
N
1 760 000 FEET
R. 4 W.
(Joins sheet 76)
690 000 FEET
T. 16 N.
LA CROSSE COUNTY
(Joins sheet 86)
685 000 FEET
1 775 000 FEET
(Joins sheet 94)
6
5
4
7
8
9
1 Mile
5 000 Feet
Scale 1:15 840
0
1000
2000
3000
4000
5000
¼
½
¾


N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
¼
2 000
½
3 000
¾
4 000
5 000
(Joins sheet 77)
(Joins sheet 85)
(Joins sheet 87)
(Joins sheet 95)
R. 4 W. | R. 3 W.
T. 16 N.
1 790 000 FEET
1 780 000 FEET
690 000 FEET
685 000 FEET
Little La Crosse River
Leon Valley
Sand Creek
Leon
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
27
1
2
3
6
7
10
11
12


N
R. 3 W.
(Joins sheet 78)
(Joins sheet 88)
(Joins sheet 96)
(Joins sheet 86)
T. 16 N.
1 795 000 FEET
690 000 FEET
685 000 FEET
1 810 000 FEET
Balls Bluff
Chimney Rock
Farmers Valley
Valley
Sand Creek
Creek
ELROY-SPARTA STATE TRAIL
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾

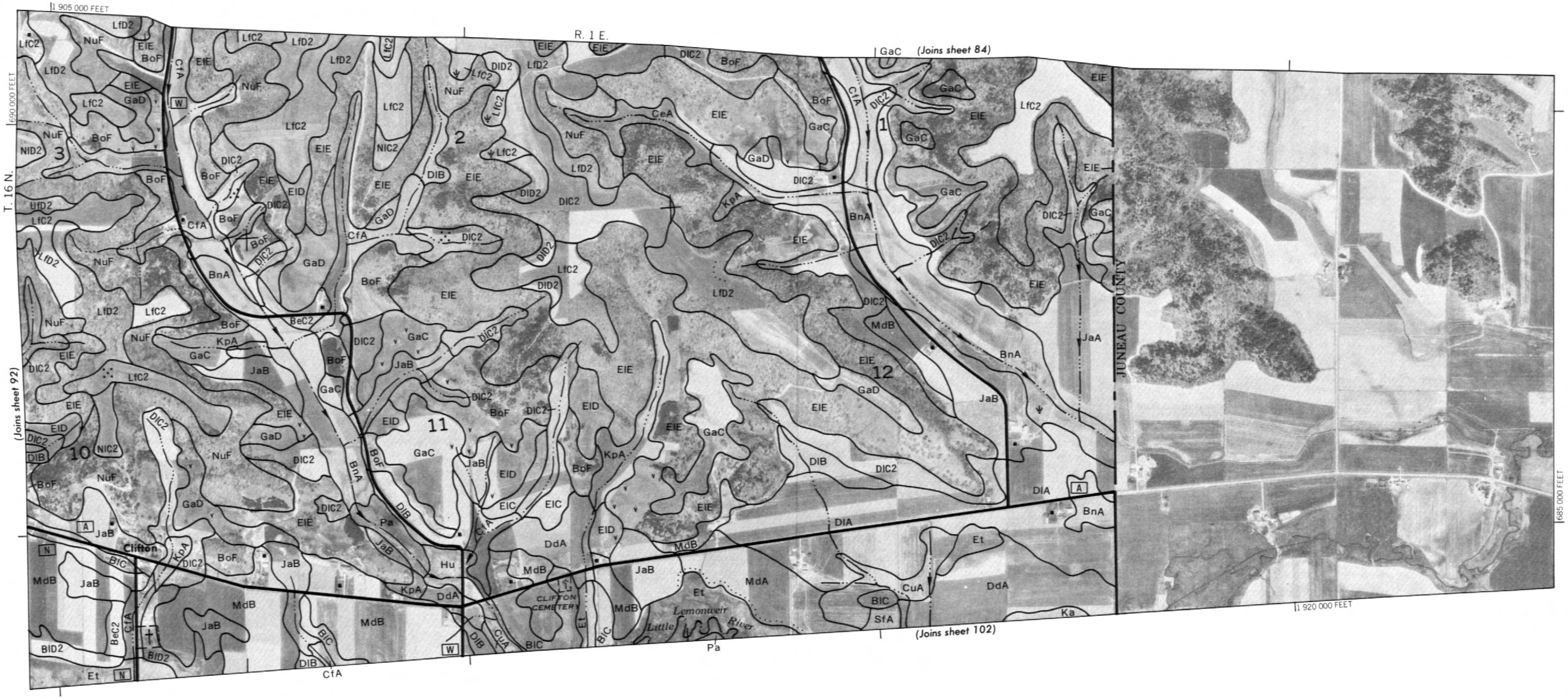

N
(Joins sheet 79)
R. 3 W. | R. 2 W.
1 830 000 FEET
(Joins sheet 87)
(Joins sheet 89)
690 000 FEET
685 000 FEET
T. 16 N.
1 815 000 FEET
KpA (Joins sheet 97)
City Rock
Chimney Rock
Farmers Valley
Farmers Valley
ELROY-SPARTA STATE TRAIL
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000

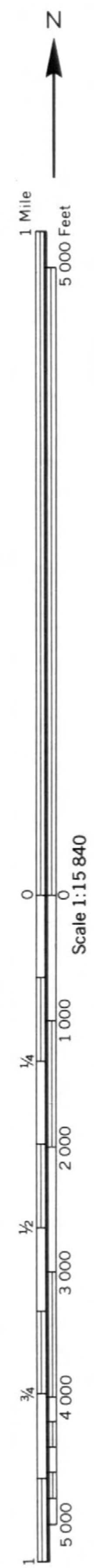

N
(Joins sheet 80)
(Joins sheet 90)
(Joins sheet 98)
(Joins sheet 88)
R. 2 W.
T. 16 N.
1 835 000 FEET
1 845 000 FEET
690 000 FEET
685 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1


N
1 Mile
5 000 Feet
0
Scale 1:15 840
1 000
¼
2 000
½
3 000
¾
4 000
5 000
R. 2 W. | R. 1 W.
(Joins sheet 81)
(Joins sheet 89)
(Joins sheet 91)
(Joins sheet 99)
T. 16 N.
1 865 000 FEET
690 000 FEET
685 000 FEET
1 850 000 FEET
Ridgeville
ST. JOHANNIS CEMETERY
Sleighton
Creek
1
4
5
6
7
8
9
12

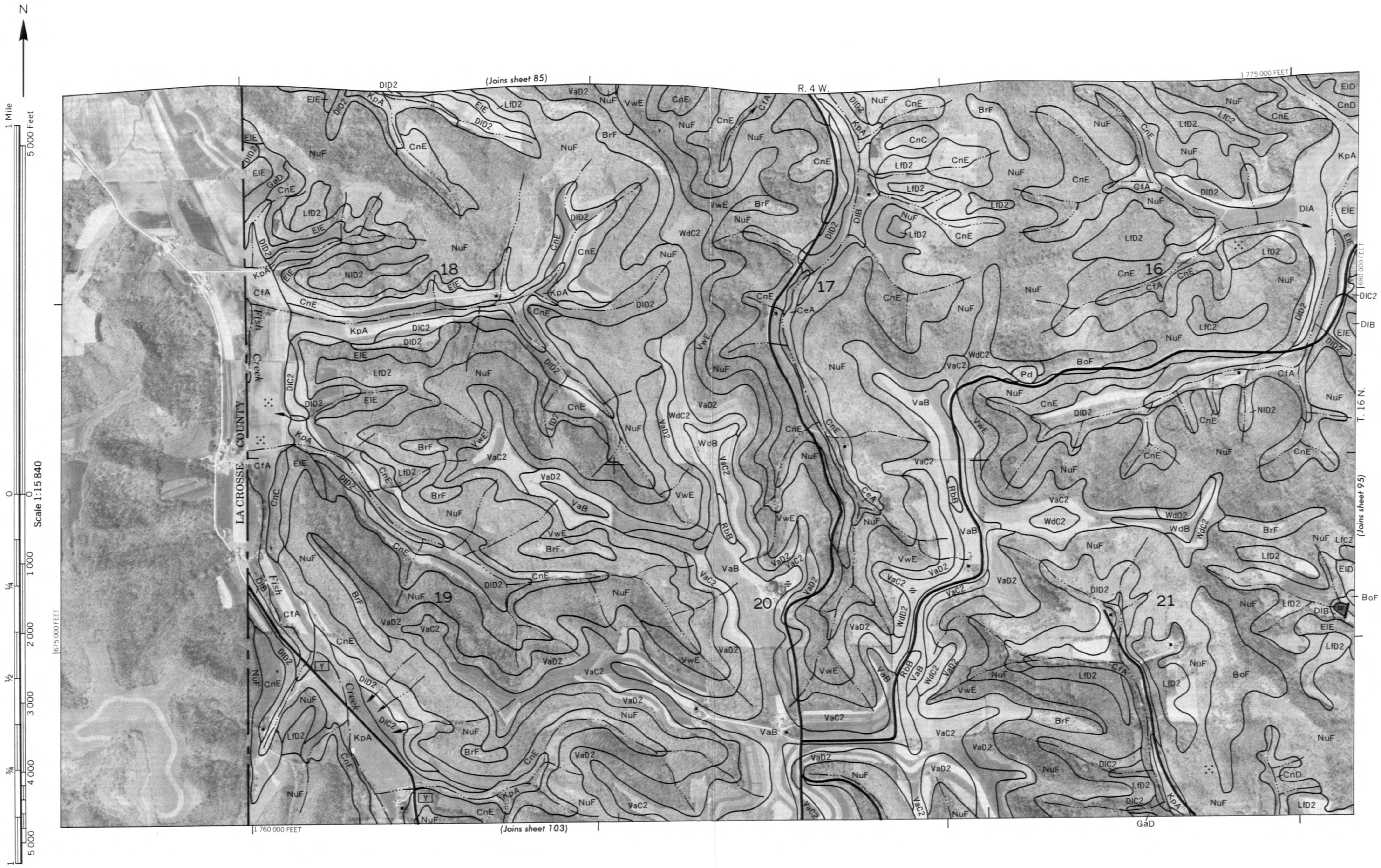

N
(Joins sheet 82)
R. 1 W.
1 870 000 FEET
690 000 FEET
T. 16 N.
(Joins sheet 90)
(Joins sheet 92)
685 000 FEET
(Joins sheet 100)
1 885 000 FEET
Cold Spring Valley
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
½
¾
1 000
2 000
3 000
4 000
5 000


N
(Joins sheet 83)
(Joins sheet 91)
(Joins sheet 93)
(Joins sheet 101)
R. 1 E.
T. 16 N.
1 900 000 FEET
1 890 000 FEET
690 000 FEET
685 000 FEET
Indian Creek
St. Peters Church
Finucan Valley
Little Lemonweir River
1 Mile
5 000 Feet
Scale 1:15 840


1 905 000 FEET
R. 1 E.
(Joins sheet 84)
690 000 FEET
T. 16 N.
(Joins sheet 92)
JUNEAU COUNTY
685 000 FEET
Clifton
CLIFTON CEMETERY
Little Lemonweir River
1 920 000 FEET
(Joins sheet 102)
1
2
3
10
11
12


N
1 Mile
5 000 Feet
0
¼
½
¾
1 000
2 000
3 000
4 000
5 000
Scale 1:15 840

MONROE COUNTY, WISCONSIN — SHEET NUMBER 94




N
(Joins sheet 86)
R. 4 W. | R. 3 W.
1 780 000 FEET
680 000 FEET
T. 16 N.
(Joins sheet 94)
(Joins sheet 96)
(Joins sheet 104)
1 790 000 FEET
675 000 FEET
15
14
13
18
22
23
24
19
Little La Crosse River
Leon Valley
Pleasant Valley
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
Scale 1:15 840
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000

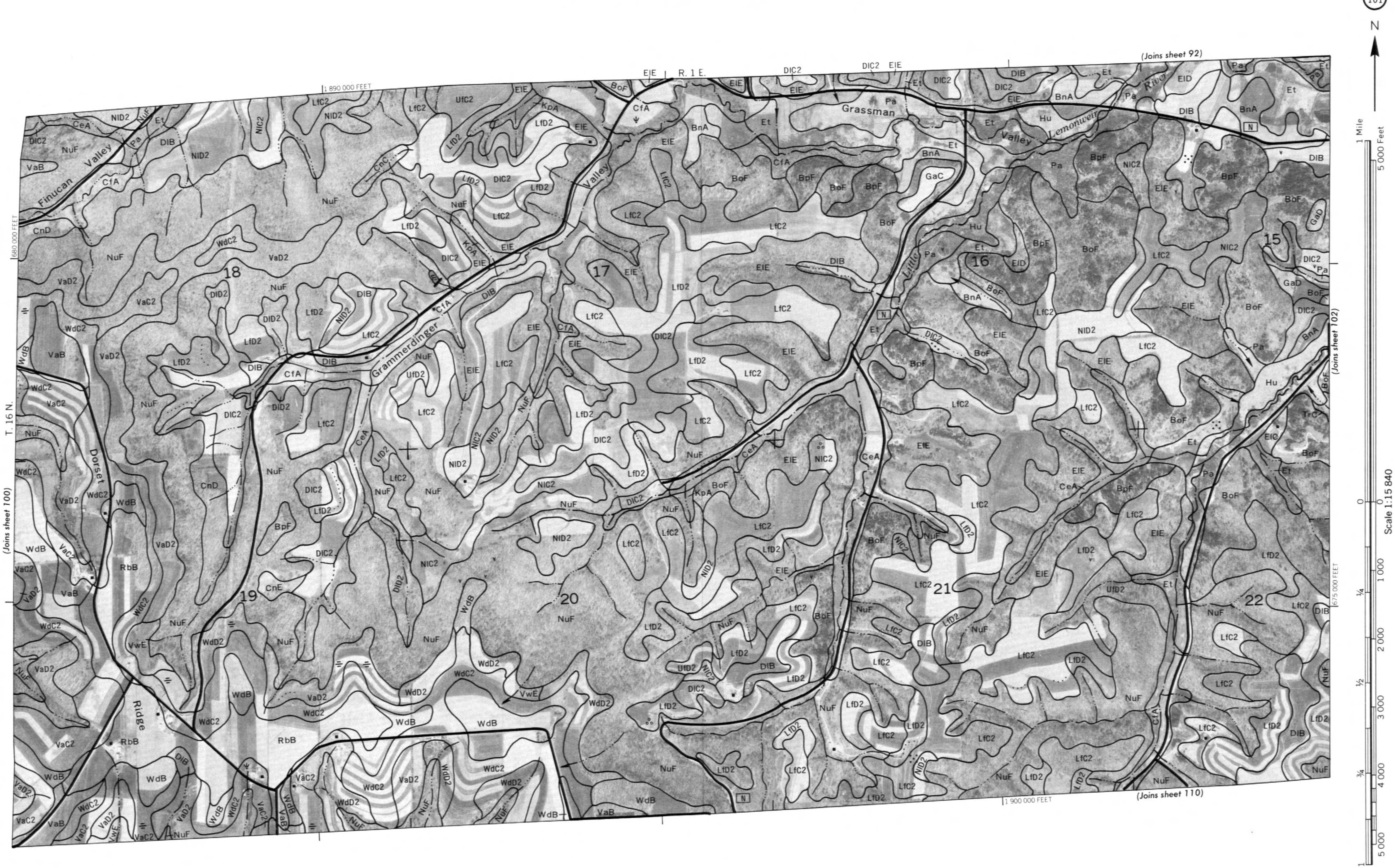
MONROE COUNTY, WISCONSIN — SHEET NUMBER 96


97
N
(Joins sheet 88)
(Joins sheet 98)
(Joins sheet 106)
(Joins sheet 96)
R. 3 W. | R. 2 W.
T. 16 N.
1 815 000 FEET
680 000 FEET
675 000 FEET
1 830 000 FEET
Farmers Valley
Farmers Valley
ELROY-SPARTA STATE TRAIL
Ka Creek
Tunnel
No. 3
St Johns Church
13
14
17
18
19
20
23
24
1 Mile
5 000 Feet
Scale 1:15 840


N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
(Joins sheet 89)
(Joins sheet 97)
(Joins sheet 99)
(Joins sheet 107)
R. 2 W.
T. 16 N.
1 845 000 FEET
1 835 000 FEET
680 000 FEET
675 000 FEET
14
15
16
17
20
21
22
23
ELROY-SPARTA
STATE
TRAIL
Moore
Creek

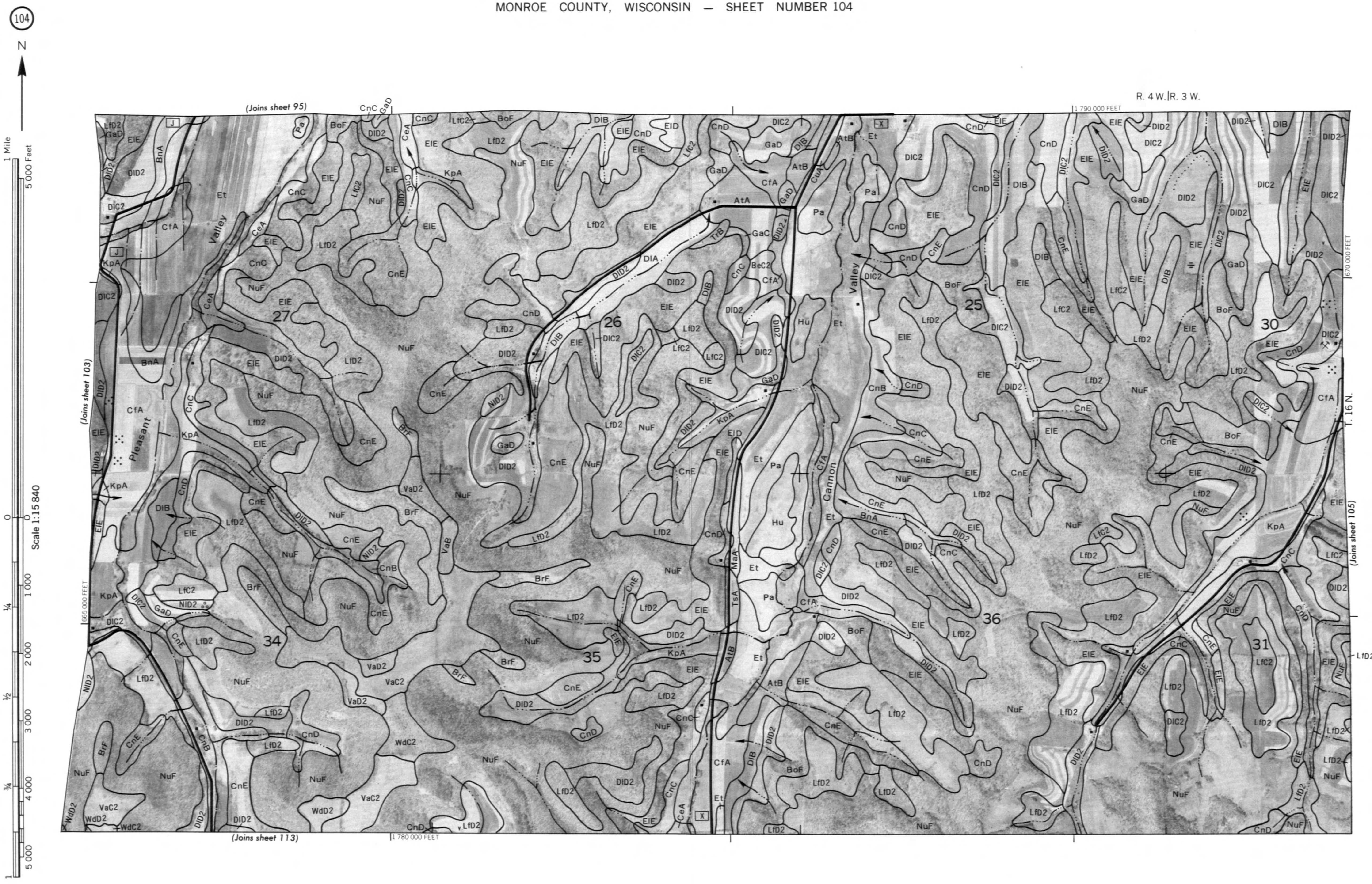

N
R. 2 W. | R. 1 W.
T. 16 N.
1 850 000 FEET
1 865 000 FEET
680 000 FEET
675 000 FEET
(Joins sheet 90)
(Joins sheet 98)
(Joins sheet 100)
(Joins sheet 108)
13
18
17
16
24
19
20
21
Sleighton Creek
Morris Creek
Creek
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
½
¾
1 000
2 000
3 000
4 000
5 000

MONROE COUNTY, WISCONSIN — SHEET NUMBER 100


101
N
(Joins sheet 92)
R. 1 E.
1 890 000 FEET
680 000 FEET
T. 16 N.
(Joins sheet 100)
(Joins sheet 102)
(Joins sheet 110)
675 000 FEET
1 900 000 FEET
Finucan Valley
Grammerdinger Valley
Grassman Valley
Lemonweir River
Little Pa
Dorset Ridge
15
16
17
18
19
20
21
22
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
½
¾
1 000
2 000
3 000
4 000
5 000

MONROE COUNTY, WISCONSIN — SHEET NUMBER 102


N
R. 4 W.
1 760 000 FEET
670 000 FEET
665 000 FEET
1 775 000 FEET
(Joins sheet 94)
(Joins sheet 104)
(Joins sheet 112)
LA CROSSE COUNTY
T. 16 N.
30
29
28
31
32
33
Fish Creek
Fish Creek Ridge
Fish Creek Ridge Cemetery
Fish Creek Ridge Church
Pleasant Valley
NuF
VaD2
VaC2
VaB
VwE
WdD2
WdC2
WdB
CnE
CnC
CnD
KpA
DlC2
DlD2
DlB
CuA
BrF
LfD2
LfC2
GaD
ElE
NlD2
NlC2
BnA
CfA
Pd
RbB
AtB
CeA
Scale 1:15 840
1 Mile
5 000 Feet
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1


104
N
(Joins sheet 95)
(Joins sheet 103)
(Joins sheet 105)
(Joins sheet 113)
R. 4 W. | R. 3 W.
T. 16 N.
1 790 000 FEET
1 780 000 FEET
670 000 FEET
665 000 FEET
Scale 1:15 840
1 Mile
5 000 Feet
Valley
Pleasant
Cannon
27
26
25
30
34
35
36
31


105
N
R. 3 W.
T. 16 N.
(Joins sheet 96)
(Joins sheet 104)
(Joins sheet 106)
(Joins sheet 114)
1 795 000 FEET
1 810 000 FEET
670 000 FEET
665 000 FEET
Little
Leon
Valley
La Crosse
River
Leon
Valley
Halls
Valley
CHICAGO
MILWAUKEE
ST. PAUL
AND
PACIFIC
27
28
29
30
31
32
33
34
1 Mile
5 000 Feet
Scale 1:15 840

MONROE COUNTY, WISCONSIN — SHEET NUMBER 106

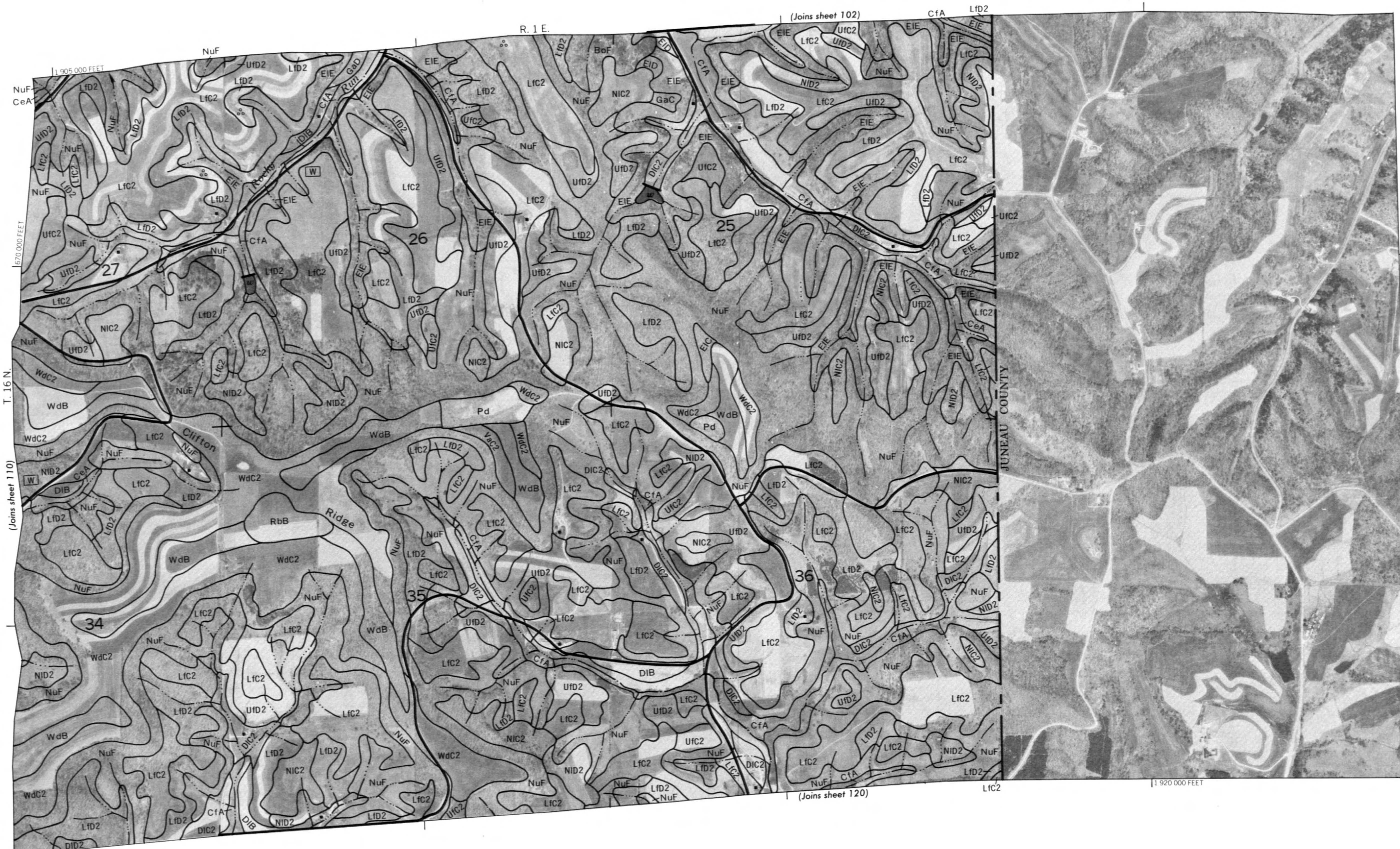

N
R. 2 W.
T. 16 N.
(Joins sheet 98)
(Joins sheet 108)
(Joins sheet 116)
(Joins sheet 106)
1 835 000 FEET
1 845 000 FEET
670 000 FEET
665 000 FEET
Norwalk
Moore Creek
ELROY-SPARTA STATE TRAIL
1 Mile
5 000 Feet
Scale 1:15 840

MONROE COUNTY, WISCONSIN — SHEET NUMBER 108


109
N
(Joins sheet 100)
1 870 000 FEET
R. 1 W.
670 000 FEET
(Joins sheet 108)
(Joins sheet 110)
(Joins sheet 118)
T. 16 N.
665 000 FEET
1 885 000 FEET
Hoye Valley
Kickapoo River Valley
Dorset Valley
Dorset Ridge
Dorset
ELROY-SPARTA STATE TRAIL
DORSET CEMETERY
28
27
26
25
33
34
35
36
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000

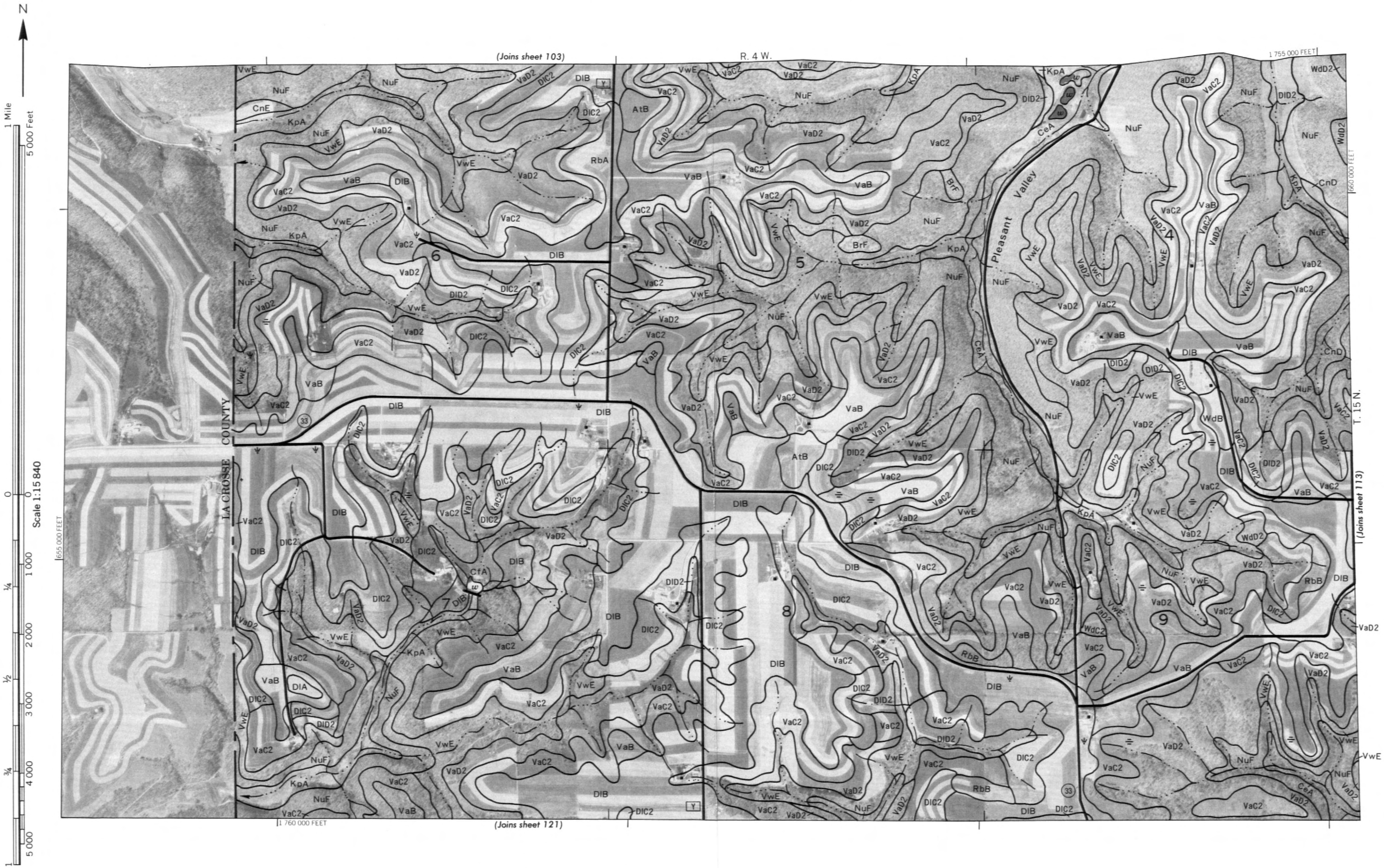

N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 101)
R. 1 E.
1 900 000 FEET
(Joins sheet 109)
(Joins sheet 111)
(Joins sheet 119)
1 890 000 FEET
665 000 FEET
670 000 FEET
T. 16 N.
Hogsback Hill
Clifton Ridge
Dorset Ridge
Spring Valley
Baraboo River
ELROY-SPARTA STATE TRAIL
Tunnel No. 1
29
30
28
27
31
32
33
34

111



N

1 Mile
5 000 Feet
0
1 000
2 000
3 000
4 000
5 000
0
¼
½
¾
1
Scale 1:15 840


N
Scale 1:15 840
1 Mile
5 000 Feet
(Joins sheet 103)
R. 4 W.
1 755 000 FEET
660 000 FEET
T. 15 N.
(Joins sheet 113)
655 000 FEET
1 760 000 FEET
(Joins sheet 121)
LA CROSSE COUNTY
Pleasant Valley
6
5
4
7
8
9
33


113
N
(Joins sheet 104)
(Joins sheet 112)
(Joins sheet 114)
(Joins sheet 122)
R. 4 W. | R. 3 W.
T. 15 N.
1 780 000 FEET
1 790 000 FEET
660 000 FEET
655 000 FEET
Cannon Valley
La Crosse River
Little
Russell
Chicago Milwaukee St. Paul and Pacific
1 Mile
5 000 Feet
Scale 1:15 840


114
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 105)
(Joins sheet 113)
(Joins sheet 115)
(Joins sheet 123)
R. 3 W.
T. 15 N.
1 810 000 FEET
660 000 FEET
655 000 FEET
1 795 000 FEET
Melvina
Little La Crosse River
Leon Valley
Halls Valley
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
3
4
5
6
7
8
9
10

115

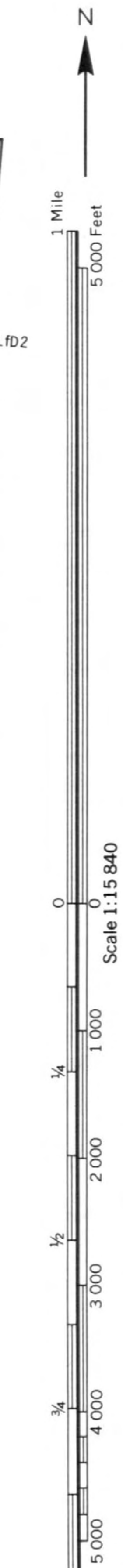
N
R. 3 W. | R. 2 W.
(Joins sheet 106)
(Joins sheet 114)
(Joins sheet 116)
(Joins sheet 124)
T. 15 N.
1 815 000 FEET
1 830 000 FEET
660 000 FEET
655 000 FEET
St. Marys
St. Marys Ridge
Spring Valley
1
2
5
6
7
8
11
12
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾


N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1
(Joins sheet 107)
(Joins sheet 115)
(Joins sheet 117)
(Joins sheet 125)
R. 2 W.
T. 15 N.
1 845 000 FEET
1 835 000 FEET
660 000 FEET
655 000 FEET
Spring
Valley
Moore
Creek
Salem
Church
2
3
4
5
8
9
10
11

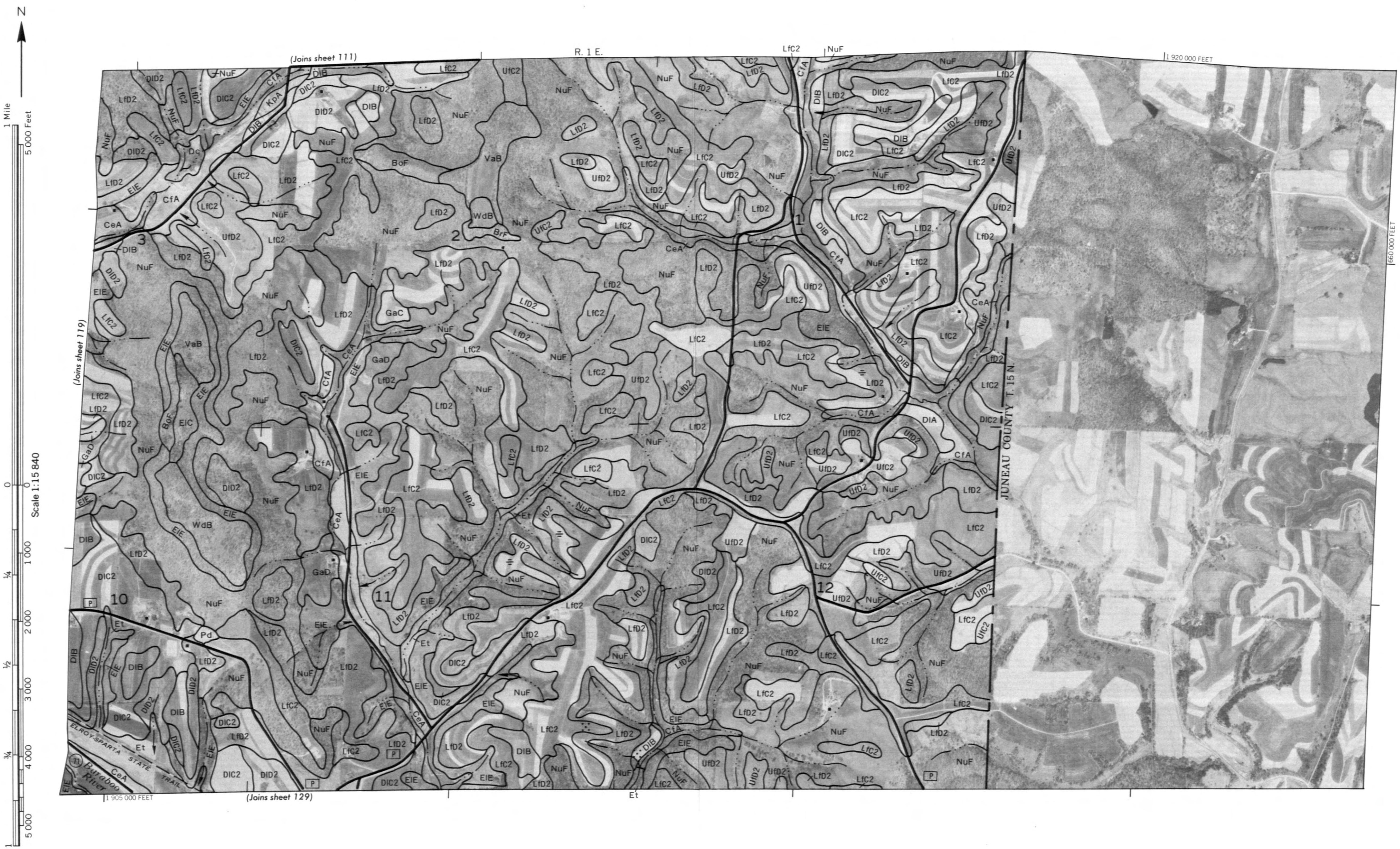

117
N
R. 2 W. | R. 1 W.
1 850 000 FEET
660 000 FEET
655 000 FEET
1 865 000 FEET
T. 15 N.
Wilton
ST. JOHNS CEMETERY
Kickapoo River
Posey Creek
Black Valley
Poe Creek
(Joins sheet 108)
(Joins sheet 118)
(Joins sheet 126)
(Joins sheet 116)
1 Mile
5 000 Feet
Scale 1:15 840


N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 109)
(Joins sheet 117)
(Joins sheet 119)
(Joins sheet 127)
R. 1 W.
T. 15 N.
1 885 000 FEET
660 000 FEET
1 870 000 FEET
North Branch Black Valley
South Branch Black Valley
Black Valley
Poe Creek
1
2
3
4
9
10
11
12

R. 1 E.
T. 15 N.
(Joins sheet 110)
(Joins sheet 118)
(Joins sheet 120)
(Joins sheet 128)
1 890 000 FEET
1 900 000 FEET
660 000 FEET
655 000 FEET
Tunnel No. 1
ELROY-SPARTA STATE TRAIL
Baraboo River
Valley
Fox River
Kendall

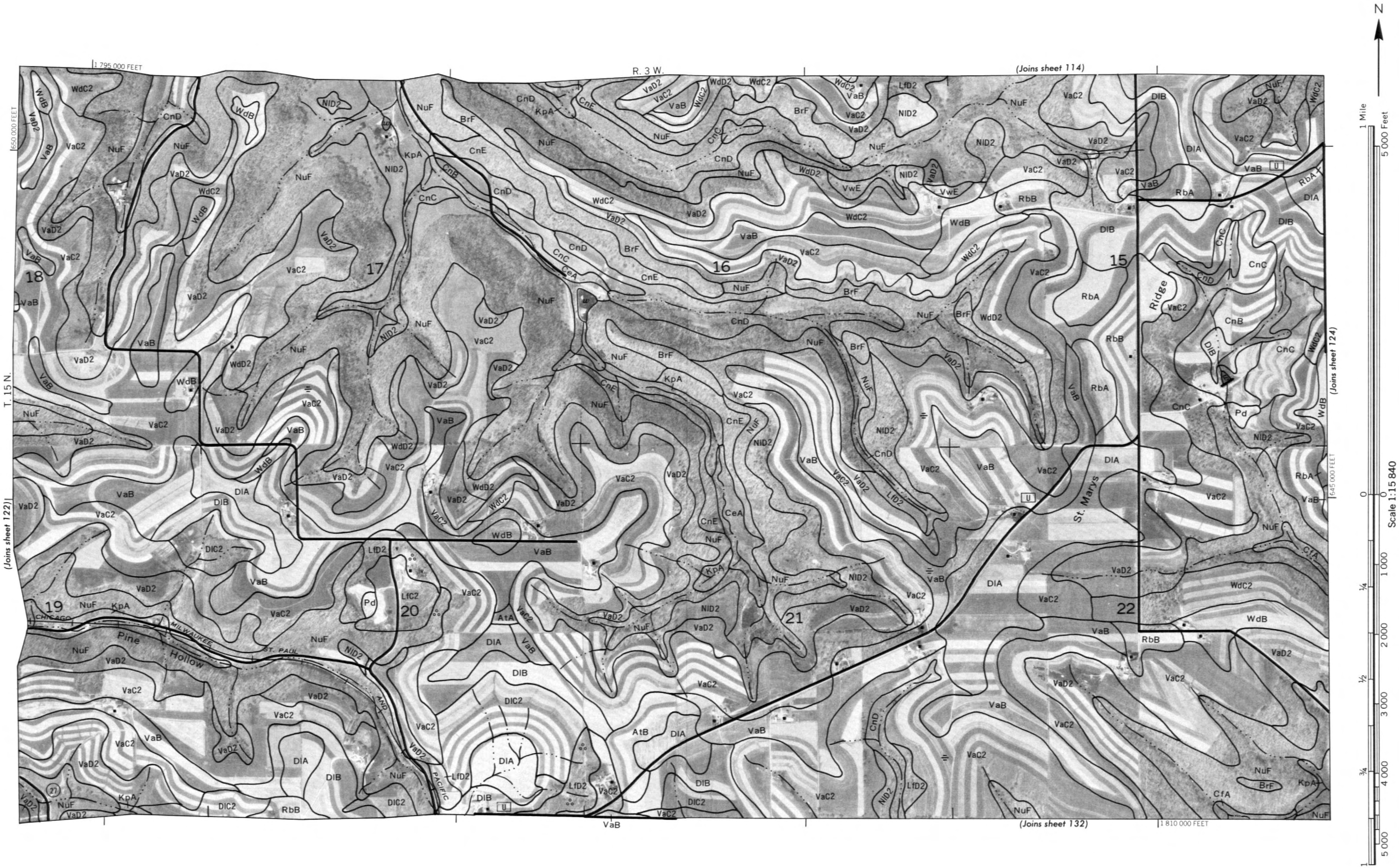


N
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1 000
2 000
3 000
4 000
5 000
Scale 1:15 840


N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 111)
(Joins sheet 119)
(Joins sheet 129)
R. 1 E.
T. 15 N.
JUNEAU COUNTY
1 920 000 FEET
660 000 FEET
1 905 000 FEET
ELROY-SPARTA STATE TRAIL
Baraboo River
1
2
3
10
11
12

MONROE COUNTY, WISCONSIN — SHEET NUMBER 121

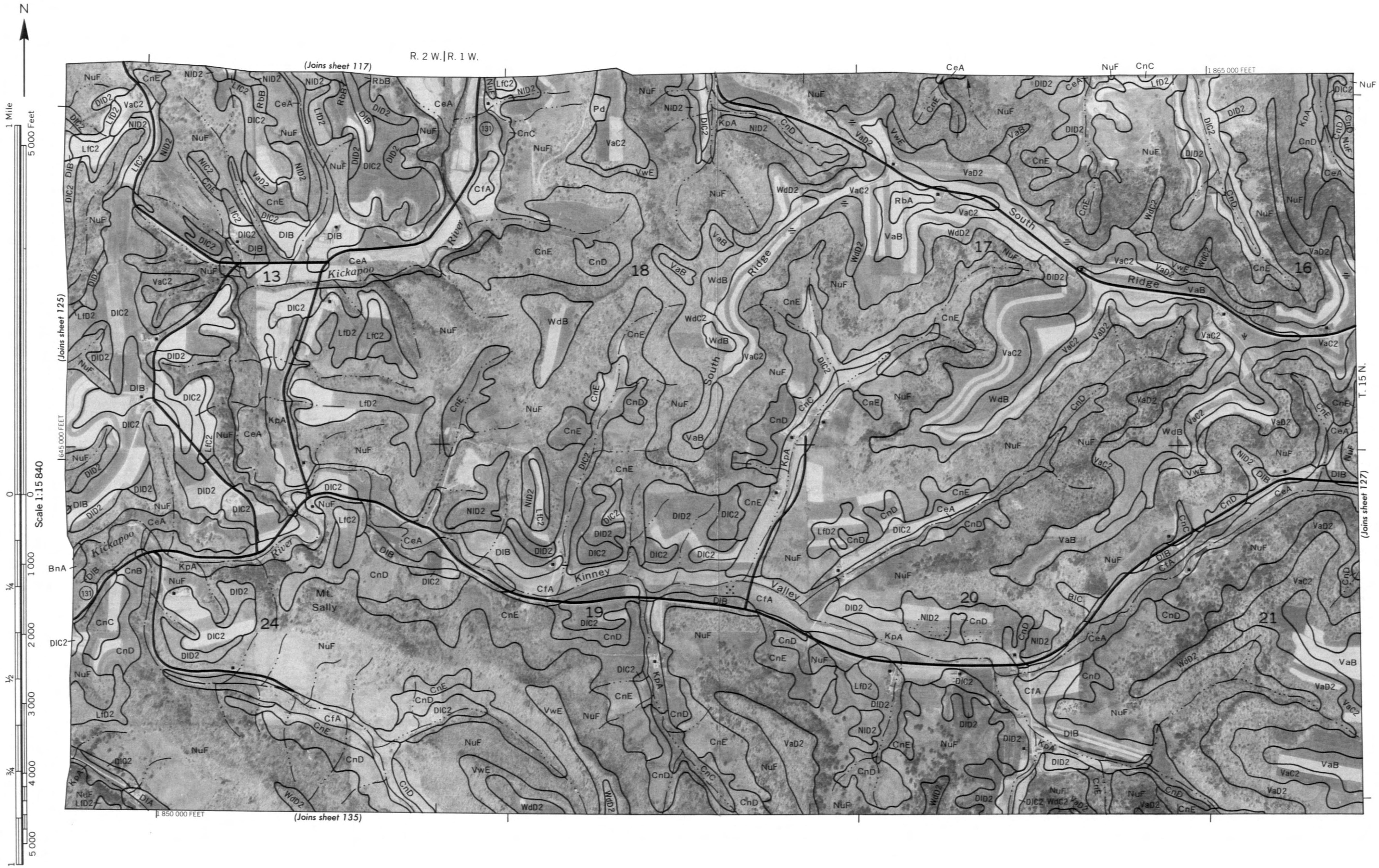

122
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
(Joins sheet 113)
(Joins sheet 121)
(Joins sheet 123)
(Joins sheet 131)
R. 4 W. | R. 3 W.
T. 15 N.
1 790 000 FEET
1 780 000 FEET
650 000 FEET
645 000 FEET
Russell
Valley
Rutlands
Coulee
Creek
Pine
Hollow
CHICAGO
MILWAUKEE
ST. PAUL
AND
PACIFIC
15
14
13
18
22
23
24
19
27
33


1 795 000 FEET
R. 3 W.
(Joins sheet 114)
650 000 FEET
T. 15 N.
(Joins sheet 122)
(Joins sheet 124)
545 000 FEET
(Joins sheet 132)
1 810 000 FEET
15
16
17
18
19
20
21
22
Ridge
St. Marys
Pine
Hollow
CHICAGO
MILWAUKEE
ST. PAUL
AND
PACIFIC
27
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
¼
2 000
½
3 000
¾
4 000
5 000
1

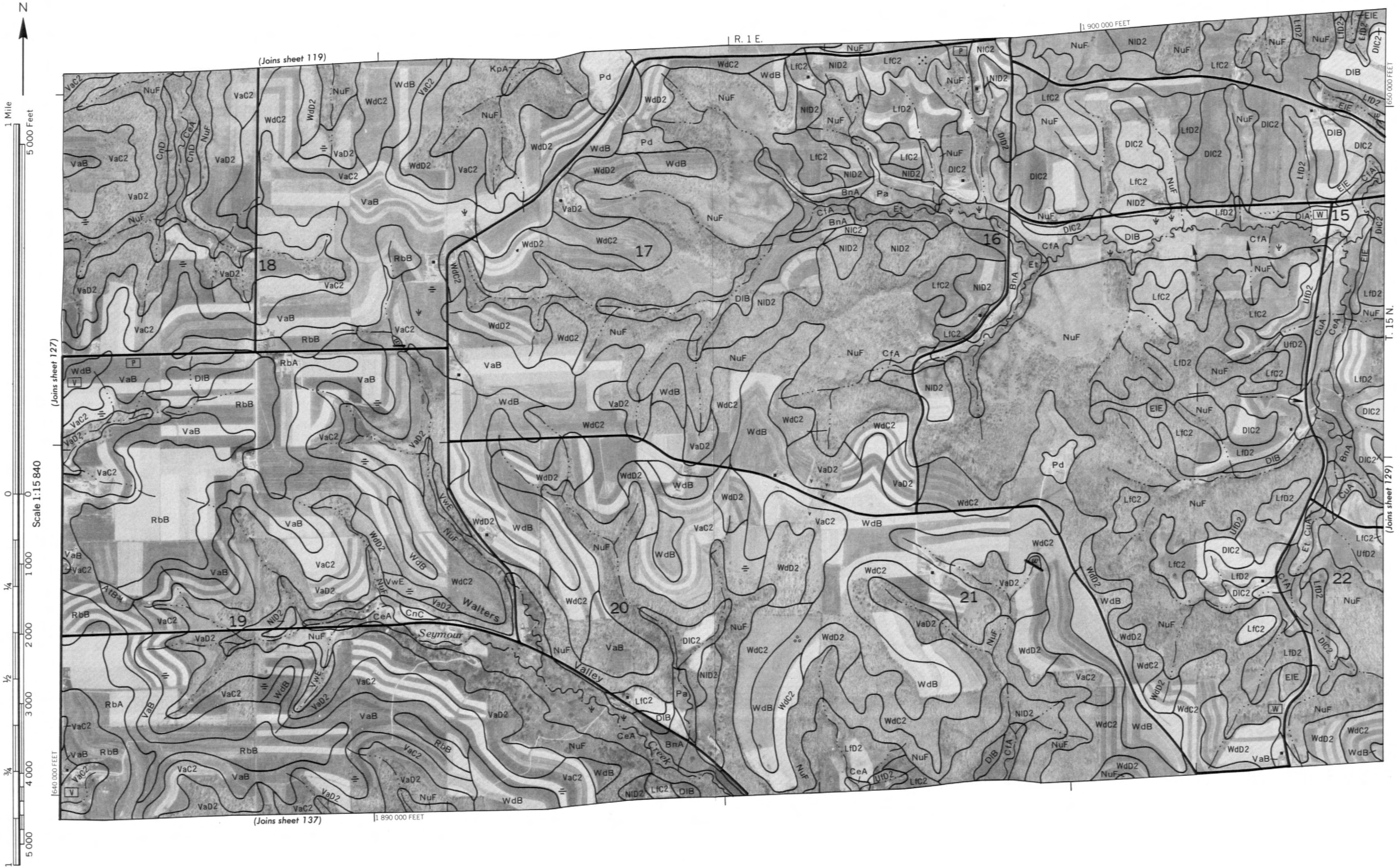
MONROE COUNTY, WISCONSIN — SHEET NUMBER 124


125
N
R. 2 W.
T. 15 N.
(Joins sheet 116)
(Joins sheet 126)
(Joins sheet 134)
(Joins sheet 124)
1 835 000 FEET
1 845 000 FEET
650 000 FEET
645 000 FEET
Cook Creek
Cook Valley Creek
Moore Creek
Kickapoo River
Mt. Thorn
Brookwood School
Scale 1:15 840
1 Mile
5 000 Feet

MONROE COUNTY, WISCONSIN — SHEET NUMBER 126




N
1 870 000 FEET
650 000 FEET
R. 1 W.
T. 15 N.
(Joins sheet 118)
(Joins sheet 128)
(Joins sheet 136)
(Joins sheet 126)
South Branch Poe Valley Black Creek
Kinney Valley
South Ridge
Ridge
South Ridge
South Creek
Billings Creek
Pleasant Ridge
ST. MATTHEW CEMETERY
Hoffman Corners
16
15
14
13
21
22
23
24
640 000 FEET
1 885 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾

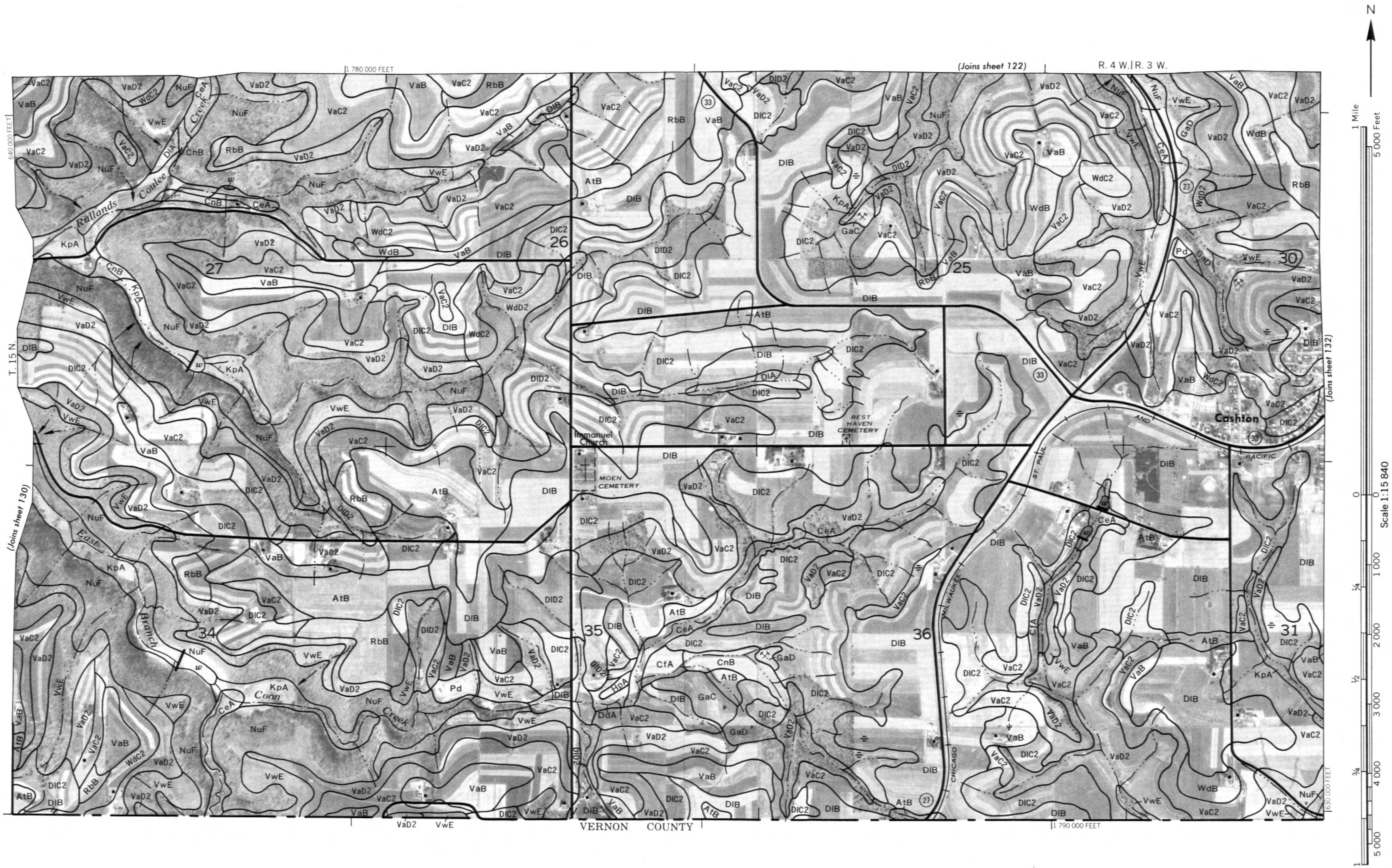

N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1
(Joins sheet 119)
(Joins sheet 127)
(Joins sheet 129)
(Joins sheet 137)
R. 1 E.
T. 15 N.
1 900 000 FEET
1 890 000 FEET
650 000 FEET
640 000 FEET
15
16
17
18
19
20
21
22
Walters
Seymour
Valley
Creek

N
(Joins sheet 120)
(Joins sheet 128)
(Joins sheet 138)
R. 1 E.
T. 15 N.
1 905 000 FEET
1 920 000 FEET
650 000 FEET
645 000 FEET
Glendale
Baraboo River
ELROY SPARTA STATE TRAIL
JUNEAU COUNTY
13
14
15
22
23
24
1 Mile
5 000 Feet
Scale 1:15 840


N
Scale 1:15 840
1 Mile
5 000 Feet
(Joins sheet 121)
R. 4 W.
1 775 000 FEET
640 000 FEET
635 000 FEET
T. 15 N.
(Joins sheet 131)
1 760 000 FEET
LA CROSSE COUNTY
VERNON COUNTY
Berge Coulee
West Portland Ridge
Rulland Coulee
Rullands Coulee Creek
Rullands
Rongstad Ridge
SKOGDALEN CEMETERY
Skogdalen Church
28
29
30
31
32
33

MONROE COUNTY, WISCONSIN — SHEET NUMBER 131

131




132
N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 123)
(Joins sheet 131)
(Joins sheet 133)
R. 3 W.
T. 15 N.
1 810 000 FEET
640 000 FEET
630 000 FEET
1 795 000 FEET
VERNON COUNTY
Cashton
SACRED HEART CEMETERY
SS. PETER AND PAUL CEMETERY
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
Upper Brush Creek
27
28
29
30
31
32
33
34


N
(Joins sheet 124)
R. 3 W. | R. 2 W.
1 815 000 FEET
640 000 FEET
T. 15 N.
(Joins sheet 132)
(Joins sheet 134)
Heiser
Valley
Brush
Creek
Upper
RUMPPE CEMETERY
25
26
29
30
31
32
35
36
33
VERNON COUNTY
1 830 000 FEET
630 000 FEET
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
½
¾
1 000
2 000
3 000
4 000
5 000

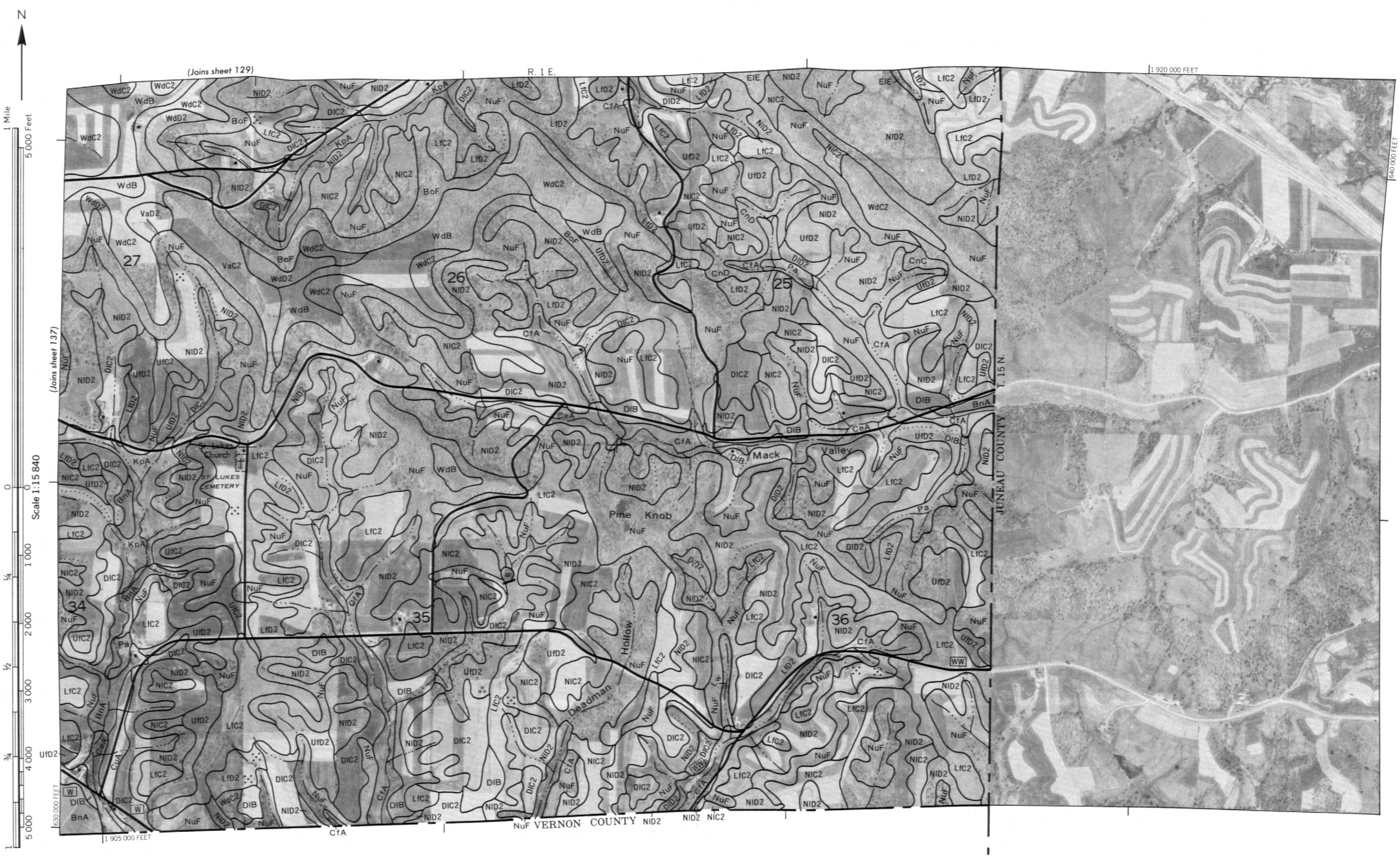
134

MONROE COUNTY, WISCONSIN — SHEET NUMBER 134

MONROE COUNTY, WISCONSIN — SHEET NUMBER 135


136
N
(Joins sheet 127)
R. 1 W.
(Joins sheet 135)
(Joins sheet 137)
T. 15 N.
Pleasant Ridge
Billings Creek
Billings Valley
Cholvin Creek
Winchell Valley
Stelting Ridge
Billings
VERNON COUNTY
1 885 000 FEET
640 000 FEET
630 000 FEET
1 870 000 FEET
Scale 1:15 840
1 Mile
5 000 Feet


N
(Joins sheet 128)
(Joins sheet 136)
(Joins sheet 138)
R. 1 E.
T. 15 N.
1 890 000 FEET
1 900 000 FEET
640 000 FEET
630 000 FEET
VERNON COUNTY
Schumann Valley
Walters Valley Creek
29
30
31
32
33
34
28
27
1 Mile
5 000 Feet
Scale 1:15 840
0
1000
2000
3000
4000
5000
¼
½
¾


N
1 Mile
5 000 Feet
Scale 1:15 840
(Joins sheet 129)
(Joins sheet 137)
R. 1 E.
T. 15 N.
1 920 000 FEET
640 000 FEET
630 000 FEET
1 905 000 FEET
JUNEAU COUNTY
VERNON COUNTY
St. Lukes Church
ST. LUKES CEMETERY
Mack Valley
Pine Knob
Hollow
Deadman
27
26
25
34
35
36